

TENDER DOCUMENT FOR **Design, Engineering, Procurement, Manufacturing, Construction, Testing and Commissioning of 400 kV Double Circuit Twin Moose Transmission Line**

SEND YOUR OFFER WITHIN 7 DAYS THROUGH E-MAIL

To,

Head Commercial
Bharat Aluminum Company Ltd.

Commercial Office
Admin Building, 1st Floor
BALCO NAGAR
KORBA – 495684
Chhattisgarh State
India

E-mail:
tender.korba@vedanta.co.in

INDEX

Attached herewith is our Tender Document for Design, Engineering, Procurement, Manufacturing, Construction, Testing and Commissioning of 400 kV Double Circuit Twin Moose Transmission Line. The details are attached below:

1. **Instruction to the Bidder.**
2. **Offer letter.**
3. **Scope of Work.**
4. **Bill of Quantities.**
5. **Contract Period.**
6. **Balco General Terms & Condition.**

We are looking forward to an extended relationship and are open to negotiate long term contracts if that is mutually beneficial.

Please note that completion of the response, in terms of the Formats to be filled and data to be furnished, will be one of the criteria for evaluation of the vendors.

We will be happy to assist you with the process. Feel free to reach out to any of the people listed below.

For Clarifications:

Commercial: Mr. Rohit Singour, Mob. No: 09179038516

Technical: Mr. Mayank Patangiwar, Mob. No: 09893110254

1) INSTRUCTION OF BIDDERS

Vedanta Resources plc (“Vedanta”) is a LSE listed FTSE 100 Company with a market cap including that of its listed subsidiaries of about \$ 50 billion. We operate across the following core business sectors: Zinc-Lead-Silver, Copper, Aluminum, Iron Ore and Energy, with operation located in geographies spanning India, Australia, UAE, Zambia, South Africa, Namibia and Ireland. Over the past 5 years the group has displayed exemplary appetite for organic and inorganic growth-with an industry leading organic growth program of \$ 20 billion nearing completion.

Bharat Aluminium Company Limited (BALCO), a Member of Vedanta India is a fully integrated Aluminium producer with an installed capacity of 245 ktpa aluminium and 810 MW of power. We are currently implementing expansion projects, which includes a 650 ktpa capacity Aluminium smelter (1st phase 3.25 ktpa) and 1200 MW Power Plant. With the completion of these projects, BALCO will have a total installed metal capacity of 1 mtpa and 2010 MW of power. Our metal business currently produces 75 ktpa rolled products & 200 ktpa wire rods & with completion of 1st phase metal expansion, rolled products & wire rods capacity shall increase to 80 ktpa & 500 ktpa respectively. Our businesses also include a coal mines and operating Bauxite mines.

What BALCO is looking forward with this contract:

- High Level of Service quality.
- 100% adherence to all the deliverables.
- Zero accidents environment.
- 100% reporting of all the near miss incidents and corrective measures for all to ensure no accident due to the unsafe conditions.
- Increased availability of all the equipments and the total system to ensure better efficiency and higher levels of productivity.
- Ensuring higher productivity per man hour by introducing better Operating Procedures.
- Introduction of innovative ideas which can save in terms of time or money.

Information / Credential of Service Providers / Bidder

The following information is Compulsory and should be furnished completed in all aspects along with your offer.

- I. Brief history of organization, along with organization chart, mentioning the Name, Designation & Tel. Nos of the contact persons in your company holding all key positions.
- II. Client list, with copies Contracts of your Top 5 clients.
- III. Banker's name and your Company's annual audited report / Balance Sheet for last 3 years.
- IV. The details of Machinery and Equipment available with you which are in working condition are to be furnished.
- V. If the space provided in the registration form is not sufficient, please attach separate
- VI. Sheets and give Annexure reference number on the attached sheet.
- VII. Registration Details
- VIII. Registration No. and date (Kindly attach a photocopy of registration certificate)
- IX. Membership to any body
- X. Any other Statutory Registration.
- XI. Registration details with taxation authorities:
 - a. Permanent Income Tax A/c No.
 - b. Service tax Registration
- XII. For any new agency participating first time in BALCO tendering, must register their company as new service vendor on our SRM Portal at www.balcoindia.com/vendorzone

2) FORMAT FOR OFFER LETTER

Head Commercial
Bharat Aluminum Company Ltd.
Commercial Office
Admin Building
BALCO NAGAR
Korba – 495684

Offer reference N.: /.....dt. **2019:**

Sir,

1. We hereby undertake to perform the scope of work as defined in the condition of Bharat Aluminum Co. Ltd., Tender Ref no:....., dated.....2019 at the prices and within the period stated in the attached schedules & in conformity with all the conditions is included therein.

2. This offer is valid for a minimum period of 90 days.

3. We agree that any Contract placed as result of this offer will be in accordance with the terms & conditions in the said offer. We declare that any other terms or conditions of the contract or any general reservations which may be printed on any correspondence of documents emanating from us in connection with tender shall not form part of any resulting contract unless specifically agreed to by BALCO and included in this contract.

4. We also enclose herewith the following documents:

A. Schedule of compliance with

1. Acceptance of contract conditions.
2. Schedule of prices (Price Formats to be completed)
3. The offer should contain all the details like Service Tax Reg. No. etc.

B. Documents required by BALCO as mentioned in “Instructions to Bidders”.

M/s (Name and Address of the Company)

Signature of the authorized Signatories

TECHNICAL SPECIFICATION

Design, Engineering, Procurement, Manufacturing, Construction, Testing and Commissioning

of

400 kV Double Circuit Twin Moose Transmission Line

(From 400 kV Sub-Station of 2010 MW Power complex at BALCO, Korba to 765/400kV Dharamjaygarh PGCIL Pooling station at Bhaisma, Urga)

LIST OF CONTENTS:

CHAPTER	DESCRIPTION
01.00	Intent of specification & site information
02.00	Scope of work
03.00	Technical Specification
04.00	Battery limit
05.00	Project schedule
06.00	Attachments

01.00 INTENT OF SPECIFICATION:

Bharat Aluminium Company Limited (BALCO), a group company of Vedanta Resources Plc, UK is situated at Korba in the state of Chhattisgarh, India. The present capacity of Aluminium smelter is 5.70LTPA with capabilities to produce ingots, wire rods and rolled products. The company has power generation capacity of 2010 MW. BALCO has two Bauxite Mines - Mainpat and Kawardha and one coal mine at Chotia.

BALCO is required to **construct 400KV double circuit transmission line** for power evacuation to PGCIL network from its 2010MW power complex which is under operation. The transmission line shall connect from 400 kV substation at BALCO power plant to 400 /765 kV substation of M/s PGCIL at Dharmjyagarh Pooling station at Bhaisma, Urga (C.G).

The intent of specification is to enable Bidder to submit a **TURNKEY OFFER** for the construction of 400 kv line & its other facilities as mentioned under technical specification including all kind of supplies and services like detailed survey , soil investigation, civil works , erection, stringing, testing , commissioning , and obtaining all govt. and non govt. statutory approvals, Approvals from appropriate & competent authorities for shutdown etc as reqd , ROW etc as it may be required for the overall construction of the line and its associated facilities included in the technical specification for its successful charging .

Approximate length of line : 24 KM.

01.01 SITE INFORMATION:-

The site lies at BALCO substation with 22°23'57.1" N latitude and at 82°44'28.1" E longitude and Urga substation at 22°16'35.5"N latitude and at 82°45'49.8"E longitude. The average elevation of the Plant and surrounding area is at about 250-350 m above mean sea level.

The meteorological data pertaining to KORBA area is furnished below:

- Extreme maximum temperature : 50 deg C
- Extreme minimum temperature : 3.6 deg C
- Average rainfall in the past years : 2633.1mm
- Average relative humidity in the past years : 64%
- Maximum relative humidity : 99%
- Average atmospheric pressure : 97kPa
- Earthquake zone : Zone II
- Wind zone : Zone-3 (44m/s or 150 kmph)

- Ice covering thickness : None

The climate varies from moderately hot and humid tropical climate to cold climate, having summer period for 8 months and winter period for 4 months in a year. The maximum temperature during summer would be in the range of 50 degree C and the minimum temperature in the winter shall be around 4 degrees C. The average normal day temperature may be considered as 32 degree C. The Bidder shall take note of the above climatic conditions at project site.

02.00 SCOPE OF WORK:-

The scope shall mainly consider following infrastructures to be built/set-up under the scope:-

- **Construction of 400 kV D/C Transmission line** - 24 ± 0.5 Kms approx.
- **OPGW cabling (24 core) instead** of earth wire in one circuit from BALCO substation to PGCIL substation (As per PGCIL specification).
- **Set-up of PLCC system** for both the circuit of the line between BALCO to PGCIL Pooling Station – 4 sets (2 sets / line , one at BALCO and other at PGCIL end)
- **Set-up of Data Acquisition System (RTU based) at BALCO end** for data communication to PGCIL Pooling Station, Urga or WRLDC, Mumbai.
- **Set-up of Phasor Measurement System (PMU)** at BALCO substation and necessary communication up to PGCIL pooling station as per PGCIL specification- 1 set
- **Set-up of Special protection Scheme (SPS)** at BALCO substation as per PGCIL /WRLDC specification- 1 set
- **Supply of 3 Yrs O&M Spares.**

The Scope shall consider the following services and supplies under Bidder Scope on Turn-key basis:-

- Engineering, Design and technical consultancy** as required for the construction of line and its associated system as considered under technical specification.
- Supply of all kind of materials** as required for construction of transmission line and its associated systems as mentioned under technical specification including Loading, unloading, storage, and watch ward for transmission line materials.
- Provide all kind of Services** – Land ROW, ROW related liasioning with local people and administrative authorities as required , detailed survey/check survey based on the survey done by BALCO, Soil investigation, drawing & design procurement, Civil supplies and Civil construction, Erection & stringing , Testing , Commissioning , Obtaining of all govt and non

govt statutory approvals , Approvals from appropriate & competent authorities for shutdown , consultancy services from PGCIL as it may be required for the overall construction of the line and its associated facilities included in the technical specification .

- d. **Testing and commissioning** of the line and its associated system.
- e. **Demonstration of the PG parameters** after successful charging of the line and its associates system as per FQP to be agreed between BALCO and Bidder.

03.00 TECHNICAL SPECIFICATION:-

3.1	ENGINEERING, DESIGN & TECHNICAL CONSULTANCY:
a	Survey Work-
	Based on the preliminary and detailed survey done by BALCO, the bidder shall require to carry out their own survey of the line before starting the construction and confirm the route and find out further optimisation.
	Preparation of profile drawing, sag-tension calculation and sag chart., tower schedule etc.
	Tower schedule shall cove all the details and angle point and height of tower and clearance from ground etc. The measurements of the angle points are indicated as Right (R) or Left (L) as per the direction of deviation with reference to the starting point.
	Computer aided tower spotting with its co-ordinates and level for the optimization of transmission line materials/quantities. This shall satisfy to the latest IE rules and regulation.
	Details report shall cover crossings of roads, canals, rivers, forest area, ponds, railway lines, P&T lines, forest area and power lines along the line route . The height above ground of the earth wire (in case of overhead crossing) and the lowest conductor (in case of crossing under existing lines) of the lines being crossed should be measured.
	Detail survey report should have all the details of tree coming in to line , all kind of road crossing , structures, buildings, huts, sheds, canals, wells, rivers, forest area, railway lines, P&T lines, power lines, ponds, hillsides, high sand dunes and other objects, etc. within 27 meters on both sides of line route should be covered in detail survey .
	Preparation of khasra details for towers which shall include survey no/plot no/village/district etc.
b	TOWER SPOTTING AND TOWER SCHEDULE
	SAG TEMPLATE: Sag template to be used and all the sagging details have to be provided as per the conductor used in the line.
	Ground clearance as per Rule 77 of the Indian Electricity Rules, 1956 and under the

	latest amendments in electricity rules & regulations should be abided.				
	Nominal System Voltage	Minimum Ground Clearance(in Meters)			
	132 kV	- 6.10 m			
	220 kv	- 7.00 m			
	400 kV	- 8.84 m			
	800 kV	- 12.40 m			
	Minimum clearance in meters between line crossings:-as per Rule 77 of the Indian Electricity Rules, 1956 and under the latest amendments in electricity rules & regulations should be abided.				
	Nominal System Voltage	132 kV	220 kV	400kV	800 kV
	Low and medium	3.05 m	4.58 m	5.49 m	7.94 m
	11-66 kV	3.05 m	4.58 m	5.49 m	7.94 m
	220 kv	3.05 m	4.58 m	5.49 m	7.94 m
	400 kV	3.05 m	4.58 m	5.49 m	7.94 m
	800 kV	3.05 m	4.58 m	5.49 m	7.94 m
	The minimum clearances required as per Rule 80 of the Indian Electricity Rules, 1956 shall be maintained, according to the voltage of the lower line, from the conductors of the line-passing near a pole / tower or any supporting structure of the second line.				
	For crossing of a non – navigable river, the clearance of the bottom conductor of lines up to 220 kV shall be at least 3 meters above the highest flood level (HFL). The clearance of the bottom conductor of 400 kV lines in such a case shall be reckoned with respect to the highest flood level (HFL).				
	The crossing span of National Highways and major roads shall not normally exceed 250Meters. One of the towers of the crossing span can be located near the road in order to obtain additional clearance. It is preferable to provide an extra clearance of 3 meters in addition to get statutory clearance over National Highways and important roads for maintaining adequate clearance from over dimensional consignments (ODC) and to account for increase in road level due to subsequent carpeting. Double suspension / tension insulator strings, depending on the type of the towers, shall be used on such crossings.				
	The minimum height above rail level of the lowest portion of any conductor of the line under conditions of maximum sag shall be as follows as per presently prevailing provisions of the Railway Regulations. The requirements as may be prevailing at the time of erection of a line should be obtained from the Railway authorities.				
	Nominal System Voltage	Broad, Meter & Narrow Gauge (in Meters)			

	<p>Above 66 kv & upto 132 kV - 14.60 m</p> <p>Above 132 kv & upto 220 kV - 15.60 m</p> <p>Above 220 kv & upto 400 kV - 17.90 m</p> <p>Above 400 kv & upto 500 kV - 19.30 m</p> <p>Above 500 kv & upto 800 kV - 23.40 m</p>
c	GEOTECHNICAL SURVEY:-
	After completion of topographical survey and after the finalization of location of towers the Bidder shall have to do the Geotechnical survey which shall include the following points:
	The scope of work includes detailed soil investigation at various tower locations such as railway crossing, major road crossing, river crossing and wherever soil strata differ.
	Soil investigation shall be carried out by drilling one bore hole of 150mm dia. at the tower center at every 1.5m interval or change of strata till refusal is met. Preparation of test report :
	The report should contain specific recommendation for the type of foundation. In case the soil parameters obtained from the soil investigation report for particular tower location, differ from the ones considered during design, a fresh design has to be developed for such location.
	Procurement of type tested design & Drawing of transmission line various type towers and its civil foundation suitable to given site conditions.
	In case of specific requirement of tower, the same to be designed by bidder by own or external agency and confirm the engineering validation before their use .
d	PREPARATION AND APPROVAL OF GTP of all materials used for construction of the line
e	FINALISATION OF VENDOR LIST in consultation with BALCO for supply of different materials.
f	SUBMISSION OF TEST REPORT for tower materials before using the same at site.
g	PREPARATION AND SUBMISSION OF ALL “AS BUILT” DRAWINGS.
h	TOWER FOUNDATION :
	<p>Foundation includes supply of materials such as cement, sand, coarse aggregates and reinforcement steel etc. Foundation designs for various tower types & their extensions and for all foundation classification as per approved drawings.</p> <p>Classification of Foundation: -</p> <ol style="list-style-type: none"> 1. Normal dry 2. Sandy Dry soil 3. Wet 4. Partially submerged 5. Fully Submerged

	6. Black Cotton Soil 7. Fissured Rock 8. Hard rock										
	<p>CONCRETE: The general guidelines but not limited to for the preparation of the concrete used for stub setting are as given in the following pares. The concrete shall be conforming to IS: 456 – 2000 (with latest amendment). The materials used in the preparation of concrete shall generally conform to the Indian Standard Specifications as mentioned below (with their latest amendments) or as provided in the specifications of the contract / work order.</p>										
	<p>CEMENT:</p> <p>a) IS: 8112 – 1989: Specifications for Portland cement (43 Grade). b) IS: 12269 – 1987: Specifications for Portland cement (53 Grade). c) IS: 1489 (Part – I) – 1991: Specifications for Portland Pozzolona cement (Fly Ash Based). d) IS: 383 – 1970: Specifications for Coarse and Fine Aggregate from Natural Sources for Concrete.</p>										
	<p>The minimum cement consumption for different types of nominal mix concrete shall be as Follows:</p> <table border="1"> <thead> <tr> <th>Nominal Mix</th> <th>Bags per Cubic Metre of Concrete</th> </tr> </thead> <tbody> <tr> <td>1 : 1½ : 3</td> <td>8.2</td> </tr> <tr> <td>1 : 2 : 4</td> <td>6.5</td> </tr> <tr> <td>1 : 3 : 6</td> <td>4.5</td> </tr> <tr> <td>1 : 4 : 8</td> <td>3.5</td> </tr> </tbody> </table>	Nominal Mix	Bags per Cubic Metre of Concrete	1 : 1½ : 3	8.2	1 : 2 : 4	6.5	1 : 3 : 6	4.5	1 : 4 : 8	3.5
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1 : 1½ : 3	8.2										
1 : 2 : 4	6.5										
1 : 3 : 6	4.5										
1 : 4 : 8	3.5										
	<p>The sand / fine aggregate used in the concrete should be Clean and sharp angular grit type and of the best quality. It shall contain hard siliceous materials, and shall be free from earth, organic matter, salts or any deleterious matters.</p>										
	<p>The water used in the concrete should be potable water. No slavish or brackish water is to be used for concreting.</p> <p>The QAP, FQAP for the civil works shall be finalized by BALCO in line with the applicable codes/good engineering practices/PGCIL specifications whichever is stringent.</p>										
i	TOWER EARTHING :										
	Preparation of earthing drawing for each tower										
	<p>The installation of the earthing shall be done in accordance with IS : 5613 – 1989 (Part 3 /Section 2) for 400 kV lines. All the earth pit drawing and test reading of earthing pit has to be provided. All the material used for earthing has to be as per IS standard and approved make.</p>										

	Tower footing resistance to be measured in dry weather after erection of tower and before stringing of earthwire. In no case the tower footing resistance shall exceed 10 ohms. In case the resistance exceed the specified value, multiple pipe earthing or counterpoise earthing shall be adopted.
j	TOWER STRUCTURE:-
	Structural steel shall conform to the stipulation mentioned in IS: 2062 – latest version. Galvanized thickness shall be 86 microns on all steel structures as per IS: 2629-1985.
	The survey done by BALCO comprising of survey report, tower schedule, abstract of towers, line profile drawing, Route Map on Tope sheet etc are attached herewith as per the list of attachment No - 1 of the technical specification.
k	CIVIL FOUNDATION :
	Carrying out check survey for re-confirming the work carried out during detailed survey, and to locate and peg marking for the tower
	Pit marking and excavation of four pits as per the excavation plan drawing.
	Sand bedding/stone shall be provided in foundations of marshy and wet black cotton foundation where there is likely of pit collapsing
	Dewatering shall be carried out by mechanical means or power driven pumps to facilitate excavation and casting of foundation at water logging areas.
	Excavation in rock: For excavation in hard rock, blasting can be resorted to. Reference shall be made to statutory rules for blasting and use of explosive for this
	Stub setting: The stubs shall be set/fixed in such a manner that the distance between the stubs and their alignment and slope are as per design so as to permit assembling of the superstructure without undue strain or distortion in any part of the structure.
	Necessary stub templates shall be designed, manufactured by the contractor.
	Concreting: concreting shall be done as per the foundation design & drawing approved by BALCO (as per IS: 456 latest amendments.)
	Supply of TMT bars: All reinforcement shall conform to IS: 2502. However SAIL/TATA/JINDAL make TMT bar is preferred.
	Curing of foundation is to be done after 24 hours of setting of concrete by keeping the concrete wet for a period of minimum 7 days.
	Coping of all chimney foundation.
	Backfilling of tower foundation with proper compaction.
	Revetment/Retaining wall: The tower foundation where there may be chances of soil collapse, with proper design a revetment/retaining wall shall be made around the four

	sides (as per design) of the foundation to protect the soil from collapsing. This shall random rubble stone masonry including excavation (1:5 cement mortar), stone bound in galvanizing wire netting including excavation, backfilling and leveling of volumes enclosed by revetment , M15 concrete , Nominal mix 1:2:4 for top steel cover, apply of chemical in stub for its preservation.
	A Quality Assurance Plan (QAP) is to be submitted for approval by BALCO before commencement of civil work and the Contractor is to strictly follow the approved QAP.
I	TOWER ERECTION
	The scope of tower erection work shall include:
	Tower shall be erected as per the erection drawing furnished by the Bidder approved by BALCO
	The tower shall be erected on the foundation not less than 10days after concreting.
	Any damage to the steel and injuring of galvanizing shall be avoided.
	No members shall be subjected to any undue over stress, during erection.
	All nuts and bolts shall be tightened properly using correct size spanners. Before tightening it is ensured that filler washers and plates shall be placed in relevant gaps between members and bolts and one spring washer is inserted under each nut.
	Tack welding/peripheral welding with zinc paint is to be provided in all nuts.
	No hole shall be left blank in tower structure. It shall be covered by welding or bolting.
	The final erected tower shall be truly vertical after erection and no straining is permitted to bring it in alignment.
m	STRINGING OF CONDUCTOR AND EARTHWIRE
	Stringing shall be done by the help of tension stringing equipment which may be Tensioner & Puller or a pulling vehicle.
	While stringing of conductor & earthwire, care shall be taken such that the conductors don't touch and rub against the ground or objects which could cause scratches or damages to the strands.
	Adequate grounding shall be established at all sites during stringing. All the equipment, conductors, anchors and structures within the work area shall be bonded together and to the ground.
	In case of any damage caused to the strands of conductor during the course of stringing, repairing of conductors shall be done by Repair sleeves, but in case of minor damage, scuff marks only
	The tensioning and sagging shall be done in accordance with the approved stringing charts before the conductors and earthwire are finally attached to the towers through the

	earth wire clamps for the earth wire and insulators string for the conductor by using sag boards.
	Vibration damper/Spacer dampers are to be fixed on conductors immediately after its clipping. The number of dampers/spacer damper is to be provided as per design.
	Jumper shall be formed in parabolic shape and fixed at angle towers to ensure maximum clearance with tower body. Pilot suspension insulator string shall be used in large angle tower. Clearance of jumper with tower body shall be checked for each jumper before final handing over of line.
	Fixing of span markers with earthwire for aviation requirement
	Dismantling & Destringing:
	Destringing of some portion shall be involved in some portion of the existing LILo line/permanent line
	Utmost care need to be followed during the above mentioned work so that there shall not be any damage to conductor, hardware or any parts of the PGCIL tower.
n	PLCC SET-UP:-
	Bidder shall require to set-up the PLCC system at BALCO and at PGCIL end for both the circuit of the line as per PGCIL standard norms. There will be 1 set of PLCC per circuit at each end. Total qty will be 4 sets.
	PLCC specification and make shall be strictly in accordance to PGCIL approved make
	Each set shall have 2 Nos of Speech+ Data panel and 2 Nos of Date + Speech panel.
	Bidder shall require to arrange approval/vetting of PLCC scheme before installation from PGCIL.
o	DATA ACQUISITION SYSTEM (DAS):-
	Bidder shall require to provide 2 Nos of RTU based system at BALCO end for accessing all required data from its 400 kV and 220 KV Substation of 2010 MW power complex.
	Digital or Analog I/Os shall be approximately 350 Nos.(will be finalized with WRLDC / PGCIL during execution)
	RTU -1 (220 kV system) shall be connected to RTU-2(400 kV system) and there will be a common PC based system at BALCO 400 kV substation for monitoring and configuration.
	The RTU-2 shall have O/Ps data on IEC870-5-101 protocol with a future option of IEC870-5-104.
	From RTU-2 , the data shall be sending to PGCIL , URGa pooling station through PLCC system . (PLCC system as mentioned above should have required Modem for data accessing and transmitting between BALCO & PGCIL S/ss.

	At Both ends(BALCO & PGCIL URGA), Modem (ABB NSK 5) to be considered as part of RTU system
	In case of non- readiness of required server at URGA PGCIL substation. The RTU-2 should have option of sending data to WRLDC directly through lease line facility . The lease line shall not be part of the system , will be taken separately during its requirement.
	The RTUs at BALCO substation shall be installed at respective control room which is within the switchyard only.
	All cabling from outdoor switchyard and its substation area to RTU system shall be considered in bidder scope including cable schedule , cable sizing , their supplies, laying termination etc.
	If any auxiliary contractor or relays required in existing system for multi contacts , the same to be considered by bidder in bidder scope.
	Bidder shall require to arrange required approval/vetting of DAS system before installation from PGCIL and WRLDC.
	The preliminary block diagram for above proposed RTU set-up is enclosed in ATTACHMENT- 7
p	PHASOR MEASUREMENT UNIT (PMU):-
	Bidder shall require to supply and set-up PMU (Phasor Measurement Unit) at BALCO 2010 MW power complex. as per the PGCIL specification . The PGCIL specification is attached with the technical specification as ATTACHMENT-6
q	OPGW SET-UP :-
	Bidder shall require to supply and lay OPGW cabling from BALCO 400 kV substation to PGCIL 400/765 kV substation having 24 cores . This shall mainly utilize for PMU (Phasor Measurement Unit) . The PGCIL specification is attached with the technical specification as ATTACHMENT-5
r	SPECIAL PROTECTION SCHEME (SPS):-
	Bidder shall require to supply and set-up SPS at BALCO 2010 MW complex as per the PGCIL/WRLDC specification. The specification to be arranged later during execution.
s	TESTING AND COMMISSIONING
	Before the line is energized following points are to be verified:
	Visual inspection of the line shall be carried out to check that all nuts and bolts are tight, insulators and accessories are in position.

	The earthing of each tower shall be checked to verify that these are in order.
	<p>Conductor continuity test: This shall be done to verify that each conductor of the overhead line is properly connected electrically. The value of the electrical resistance shall not vary abnormally from that of a continuous conductor of same size and length.</p> <p>This test shall be done in co-ordination with PGCIL and with their standard procedure and practice.</p>
	Insulation resistance test: This test shall be done in in co-ordination with PGCIL and with their standard procedure and practice to ascertain insulation condition of the line.
t	SAFETY & QUALITY PLAN:
	SAFETY:
	Safety must be a prime concern for working at all sites. There are some list of points are required
	All handling /transport and rigging equipment including lifting tools and tackles shall be checked at regular intervals. These shall be duly certified by third party for its healthiness and the same shall be kept in good and safe working condition. A register is to be maintained regarding the results of periodical tests/checks and other particulars in respect of each and every such equipment
	When the work is carried out at night or in the obscure day light, adequate arrangements for flood lighting in the working area shall be made by Supplier at his own cost and got approved by the Purchaser.
	All machinery and equipment must be equipped with safety devices. The safety provisions shall conform to the recognized standards, safety codes and statutes.
	All safety measures as required to be adopted as per the statutory regulations and the safety rules of the plant shall be strictly followed by the Supplier during the execution of the Contract.
	When the work is carried out at height, special precaution must be adopted for this type of work. The execution team must use fall arrestor with life line. All workmen working at height should be skilled enough to perform the job and must have experience in this field. All workmen must be equipped with full body harness safety belt during height work. One Safety officer need to be deployed at site during this type of height work execution.
	Adequate number of first aid boxes as defined in the State Factory Rules shall be a provided and maintained at all work site.
	Emergency vehicle shall be made available at site to handle any kind accident happening at site.
	Tool box talk is to be delivered every day before starting of any kind of work.

	QUALITY PLAN:
	The supplier shall submit model Quality Assurance Plan as applicable to the specific project covering major phases namely, Design & Engineering & Procurement, Post Ordering, and Site Execution, Testing & Commissioning in clear terms. The basic minimum elements that must be addressed in Quality Assurance Plan are:
	Design, Engineering & Procurement Phase:
	- Submission/re-submission of drawing for approval.
	- Drawing distribution and associated document control.
	- Purchasers & Suppliers verification of sub-suppliers' Supplier/services.
	- Agreement on acceptance criteria through approval of Quality Assurance Plan.
	- Ongoing surveillance/scouting on sub-suppliers.
	Post Ordering Phase:
	Tower structure materials, nut bolts, tower accessories etc. shall confirm to latest IS standards.
	Handling, storage, packaging and delivery specification to avoid deterioration / damage of equipment / components / materials supplied.
	Inspection and testing of structural members, conductor, earthwire, hardware, insulators etc
	Fulfilment of pre-inspection and post inspection documents and their processing.
	Distinct identification tags for acceptance/rejection.
	Site Execution Phase:
	Stub fixing for tower foundation work shall be done by Supplier. It is required to fix the stub by using stub-setting template, however if it is done by Probe-method than the slope of the stub shall be maintained properly so as to avoid any difficulty during erection of tower.
	During civil foundation work, checking of reinforcement, cement, sand, mixing proportion etc shall be done by BALCO/third party (appointed by BALCO). Pour card is to be signed by BALCO/third party (appointed by BALCO) before doing any type of concreting at site
	After erection of each tower BALCO/third party (appointed by BALCO) shall cross verify the tower for proper fixing of members, nuts & bolts etc.
	After stringing of each span BALCO/third party (appointed by BALCO) shall cross verify the physical sag with the calculated sag for that span.
	At the location where crossing with power line, road or railway etc special care must be taken during stringing to maintain proper sag as per the theoretical calculated value. Variation in sag in this span shall not be acceptable
	Any type of damage of conductor, insulators, hardware etc during stringing work, or at the

	time of transportation shall be avoided. Any damage to these materials should be borne by the Suppliers.
	Testing and commissioning of line shall be done as per PGCIL requirements/standards. Line should meet the required PG parameters.
3.2	SUPPLY :- (Estimated transmission line BOQ can be referred from attachment -8 for reference)
	The supply under bidder scope shall mainly include but not limited to the following materials:-
a	Hot dip galvanized Tower Structures (PGCIL or equivalent type tested design suits to zone-III site condition)
b	Tower hard-wares (GI stubs , galvanised nut &bolts with pack washers, hex bolts, nuts, step bolts for towers)
c	Stringing hardware for conductors and OPGW accessories (Mid span compression joint for ACSR moose conductor & Earth-wires /OPGW, Repair sleeve for ACSR Moose conductor, flexible copper bond for earthwires, Vibration dampers for conductors/earth wires, Bundle spacers for line,Rigid spacers for jumpers, earthwire suspension clamp, Earth-wire tension clamp, span markers for aviation requirements ,danger plate, Number plate, Phase plate (set of three) , Circuit plate (set of two) , Anti-climbing device, bird guard(set of three) Arcing horns , Corona control ring/grading ring ,Span markers for aviation requirement ,Pre-formed Armour rods, Clevis Eye, Free center type/ Armor grip. Compression type dead end clamp, Sag adjuster etc..
d	Earthing of towers- Pipe type/counterpoise type -120 M length as per approved drawing.
e	OPGW wire of 24 core with all mounting hardwares and its accessories
f	ACSR Twin Moose conductor (Twin bundled), 54/7/3.53mm.or equivalent
g	Composite Long rod Silicon disc type Insulator Antifog /higher creepage (120 KN, 160 KN)
h	Hardware fittings (Single suspension type 'I' Insulator string (suitable for 1 x 23 ,120 KN disc insulator or 1 x 3 ,120 KN Long rod insulator) and Double Tension Insulator string (suitable for 2 x 23 ,160 KN disc insulator or 2 x 3 ,160 KN Long rod insulator)
i	PLCC equipments- 4 sets (without wave trap) - PLCC panels, Coupling device, Modems, EPABX system, Co-axial cables etc as per PGCIL approved scheme and make.
j	Data Acquisition System (DAS): 1 set- 2 nos of RTU system + 1 PC based system for

	data monitoring and configuring as described under detailed technical specification.
k	PMU and SPS system : 1 set- as described under detailed technical specification.
l	Coaxial & other signaling cable with accessories -1 lot - As required for above PLCC / DAS/ PMU/ SPS system.
m	Power and control Armoured /Non - Armoured cables -1 lot (suitable size)
n	Supply of 3 yrs O&M spares for transmission line , PLCC and other system- 1 lot (list to be submitted by bidder along-with the bid documents), Transmission line spare requirement is given in detail survey report attached herewith.
3.3	SERVICES :- (Estimated transmission line BOQ can be referred from detailed survey report for reference)
I	CIVIL:
a	Detailed survey/check survey based on the survey done by BALCO including route alignment, profiling, tower spotting etc.
b	Right of way, Crop compensation & its related liasioning including payment /settlement of compensation with local people and administrative authorities as required during start of civil foundation of tower.
c	Soil investigation in all kind of soils in all tower locations
d	Civil construction for tower foundation (including supplies of all kind of civil and reinforcement materials, manpower)
e	Benching of tower footing locations as may be required looking into the site condition
f	Coping of tower foundation legs and backfilling evenly in all tower foundation locations.
g	Construction of retaining wall in certain locations by jointly verifying with Balco which may be required to stop soil collapse in tower footing area.
II	ERECTION , TESTING , COMMISSIONING
a	Receipt, loading, unloading, storage and security of tower line and other material at the 'Site' shall be in Bidder's scope. The Bidder shall make suitable storage yard with security arrangements including employment of security personnel to ensure the security & protection of all materials from theft/damage.
b	Erection, stringing, Testing, Commissioning of transmission line.
c	Erection, Testing, Commissioning of other associated system as considered under the scope.

	PLCC system
	OPGW cable
	RTU system
	PMU and SPS system
d	Obtaining NOC/approvals from local authorities like DC/gram panchayat//Nagar Nigam etc. as applicable. (Approvals from appropriate & competent authorities like NOC from district collector, public notification by District Collector to the public regarding start of construction of line, taking NOC from Local authorities like Gram sabha/ nagar nigam etc as may be required for laying of transmission line.)
e	Obtaining all types of statutory approvals- under section 68 & 164 of Electricity rule 2003, Power line crossing , PTCC, Forest, Airport authority , CEA line charging, WRLDC approval, National Highway, Railway, Irrigation etc.... as may be required for overall completion /construction of the line.
f	Statutory fees as required under above approvals shall be in BALCO scope. Any consultancy or other service fees shall be in Bidder scope.
g	Tower Design & Drawing procurement suitable for twin Moose conductor and Wind Zone-III.
h	Vetting of PLCC, DAS, PMU and other system as required from PGCIL / WRLDC as per of consultancy services to be in bidder scope.
i	Right of way, Crop compensation & its related liasoning including payment /settlement of compensation with local people and administrative authorities as required during erection/stringing
3.4	Additional work in BALCO existing 400 kV D/C Permanent & LILO transmission Lines.
A	From MRSDS switchyard a route to be surveyed for approximately 700Mtr to establish tentatively three numbers of towers to connect with existing Tower No 17 of 400kV transmission line (from 1200MW power plant to PGCIL Dharamjaygarh pooling station, Urga), so that the existing line will be connected with MRSDS swyd and will be finally disconnected with 1200MW swyd.
B	Supply and installation of 400kVtowers (tentatively three nos). Carry out de-stringing of existing Conductors/Earthwire/OPGW etc and stringing of new one to connect with existing 400kV transmission line from 1200MW power plant to PGCIL Dharamjaygarh pooling station, Urga.

C	After disconnection with 1200MW switchyard and connecting with MRSDS switchyard Testing and commissioning of MRSDS SWYD- PGCIL URGA line is to be carried out as per standard PGCIL norms/procedure.
D	De-stringing of existing Conductors/Earthwire/OPGW etc of 400kV permanent transmission line (from 1200MW power plant to PGCIL Dharamjaygarh pooling station, Urga) from tower T5 to T6 and stringing of new one in existing LILO transmission line tower T6. So the new line will continue in LILO portion upto Tower No T8/T9.
E	De-stringing of existing Conductors/Earthwire/OPGW etc of 400kV LILO transmission line from tower T9 to T10 and stringing of new one in new transmission line tower from T9 to AP 0/0. So the new line will be emanating from 1200MW power plant to PGCIL Dharamjaygarh pooling station, Urga
F	Testing and commissioning of 1200MW SWYD- PGCIL URGA line is to be carried out as per standard PGCIL norms/procedure.

04.00 BATTERY LIMITS:-

- a) Start and end point shall be considered as given in site information.
- b) All kind of electrical and non electrical statutory fees– **In BALCO scope**
- c) All fees towards vetting / approval/ consultancy etc- **In Bidder scope**
- d) All Land ROW settlement compensation- **In Bidder scope**
- e) Storage arrangement for materials at outside of plant area- **In Bidder scope**
- f) Tower design – PGCIL make, bidder to place the order for purchase of the design and drawing- **In Bidder scope**
- g) Forest Approval- All afforestation/ deforestation etc compensatory payment including land – In BALCO scope on actual basis however liasioning and other facilitation cost - **in Bidder Scope.**

5.00 PROJECT SCHEDULE:-

- **12 months for getting all statutory approvals (including forest approval) & getting R.O.W. clearance from land owners, from date of letter of issue of order (Bidder shall require to submit the tentative schedule along-with bidding document)**
- **12 months for design, engineering, manufacturing, supply, erection, testing and commissioning of transmission line, from the date of getting Stage-1 approval from MOEF-CC & consequently getting working permission from forest department (Bidder shall require to submit the tentative schedule along-with bidding document)**

Kick off meeting – Within 15 days from date of ordering.

LIST OF PREFERRED MAKES:-

SR.NO	DESCRIPTION	DETAILS
01	Tower design	PGCIL or equivalent suitable for zone-III and type tested design.
02	Tower hard-wares	As per IS standard
03	PLCC	PGCIL approved(ABB make)
04	Moose Conductor	PGCIL approved as per IS standard

6.00 LIST OF ATTCHMENTS:-

SR.NO	DESCRIPTION	ATTACHMENT NO
01	Survey Report	Refer Attachment-1
02	Tower Schedule & Abstract of Towers	Refer Attachment-2
03	Route Map on TOPO sheet.	Refer Attachment-3
04	Line Profile drawing	Refer Attachment-4
05	PGCIL OPGW Specification	Refer Attachment-5
06	PGCIL PMU Specification	Refer Attachment-6
07	RTU Architecture Set-up (Preliminary block diagram)	Refer Attachment-7
08	Tentative BOQ	Refer Attachment-8
09	Performance & Guarantee	Refer Attachment-9

*******END*******