

# **BOKARO POWER SUPPLY CO. (P) LTD.**

**HALL NO:- M-01, OLD ADMINISTRATIVE BUILDING,  
ISPAT BHAVAN, BOKARO STEEL CITY – 827001**

**TENDER NOTICE NO.: BPSCL/CEO/P&C/10-11/C-024/NIT-216 /3347  
dated 31/05/2010**



## ***TENDER DOCUMENT***

**NAME OF WORK: Electrical Testing, Supervision of Protection, Signaling and Conditioning Monitoring of Electrical Drives & Equipments.**

**COST : Rs. 3000/-  
(Rupees Three Thousand only)**

## **I N D E X**

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**Bokaro Power Supply Co. (P) Ltd.**  
**(A Joint Venture of SAIL & DVC)**  
**Hall No: - M-01, Old Administrative Building,**  
**Ispat Bhavan, Bokaro Steel City – 827001**  
**NOTICE INVITING TENDER**

**NIT No. : BPSCL/CEO/P&C/10-11/C-024/NIT-216/3347**

**Date : 31/05/2010**

For and on behalf of BOKARO POWER SUPPLY COMPANY (P) LTD, sealed tenders in four parts, **a) Part - I** : Cost of Tender document and documents in support of eligibility criteria, **b) Part-II** : Earnest Money Deposit, **c) Part- III** : Technical & Commercial Offer and **d) Part – IV** : Price Bid. are invited on behalf of Bokaro Power Supply Company (P) Limited, from reputed, experienced and financially sound firms for the following work at our Thermal Power Station.

Description of Work	Electrical Testing, Supervision of Protection, Signaling and Conditioning Monitoring of Electrical Drives & Equipments.
Estimated Amount (in Indian Rs.)	<b>Rs. 1,21,37,280/-</b> (Rupees One Crore Twenty One Lakhs Thirty Seven Thousand Two Hundred Eight only)
Earnest Money (in Indian Rs.)	<b>Rs. 2,42,700/-</b> (Rupees Two Lakhs Forty Two Thousand Seven Hundred only)
Cost of tender documents (Non-refundable) (in Indian Rs.)	<b>Rs. 3000/-</b> (Rupees Three Thousand Only)
Period of contract	<b>02 (Two) years.</b>
Last date & time of submission of tender	<b>09/07/2010 at 15.00 Hrs. (IST)</b>
Bid opening Date & Time.	<b>09/07/2010 at 15:30 Hrs. (Part I, II &amp; III)</b>

**Qualifying Requirements / Eligibility Criteria :**

- 1) The bidder must possess ISO 9001 certification for its enterprise, and submit a duly authenticated copy of such a certification.
- 2) The bidders must submit properly authenticated copies of previously executed work order(s) as proof of relevant experience in areas of :-
  - a) Electrical testing, protection & interlock checking, and commissioning of major electrical equipments.
  - b) Testing of generator protective relays & distances protection.

**The major electrical equipments mentioned above are elaborated as under-**

  - i) Generators (of capacity 50 MW or more).
  - ii) Transformers (of capacity 50 MVA or more).
  - iii) HV Circuits Breakers (of voltage 6.6 KV or more).
  - iv) HV Feeders (6.6 KV or more), including panels, breakers, relays, etc.
  - v) EHV outdoor Switch Yard (of voltage 138 KV or more).
- 3) Experience of having successfully completed similar work during last 3 years ending last day of month previous to the one in which offers are invited shall be either of the following :
  - a) One similar completed work costing not less than **Rs. 48,50,000/-** for one year.

**‘OR’**

  - b) Two or more similar completed works costing not less than **Rs. 24,25,000/-** for one year.
- 4) The bidder must submit authenticated proof that the bidder is active in the work area mentioned above in Point 2, for at least last Two (02) years continuously.
- 5) The bidder must submit authenticated copy of at least one customer satisfaction certificate in the same working areas as mentioned in Point 2 above, from a reputed organization like Power Plants of PSU, etc.

- 6) The bidder must employ at least one supervisor with valid supervisory certificate suitable for jobs in High Voltage Switch Yard of 138KV, & submit authenticated copies of relevant certificates issued by competent authority to substantiate the same.
- 7) The bidder must submit authenticated copies of the relevant registration certificates for providing service in the work area as mentioned in Point 2.
- 8) The bidder should have its own poll of experts who are capable of undertaking above mentioned work of testing & protection checking and of developing technical drawing, circuit diagrams etc. whenever necessary. An authenticated list of experts, employed by the bidder, along with their area of expertise / experience should be submitted.
- 9) The bidder must submit a valid Electrical License related to work in High Voltage & Extra High Voltage Equipments & areas.
- 10) Financial condition of the bidder must be sound enough and net worth positive.
- 11) a) The average annual turnover of the bidder during last three financial year shall not be less than 75 lakhs.  
b) The bidder shall submit along with the tender documents audited balance sheet, profit & loss account for last three (03) constitutive financial year.
- 12) The bidder shall furnish upto date EPF No., ESI Regn No., IT Return & Service Tax Regn No.
- 13) Authenticated (signed with seal of the company) copy of work orders and other documentary evidences showing fulfilling the above qualifying requirements must be submitted for technical & commercial evaluation.

**General Terms & Conditions:**

- i) Cost of the tender documents **Rs. 3000.00** (non-refundable) shall be deposited in the form of Demand Draft / Banker's Cheque drawn in favour of Bokaro Power Supply Company (P) Ltd on any Indian nationalized / schedule commercial bank, payable at Bokaro Steel City. However Government organizations / NSIC / SSI units shall be issued the tender documents free of cost subject to production of the documentary evidence like valid Registration certificate of the same item or group of item from appropriate Govt. Authority.
- ii) Tender shall be enclosed with Earnest Money Deposit (EMD) of **Rs. 2,42,700.00 (Rupees Two lakhs forty two thousand seven hundred Only)** in shape of Demand Drafts / Bank Guarantee drawn on any scheduled commercial Bank in favour of Bokaro Power Supply Company (P) Ltd., Payable at Bokaro Steel City. However EMD exemptions wherever applicable may be availed of by Government organization / NSIC / SSI units against proper entitlement document.
- iii) The undersigned reserves the right to either rejects any / all the tenders without assigning any reason thereof & also reserves the right to alter the qualifying requirements.
- iv) Tender papers shall not be sent by post/courier service.

**Note:**

1. Tender documents are to be downloaded from our Website: [www.bpscl.in](http://www.bpscl.in) only.
2. Bidders are requested to visit our website regularly for any addendum / corrigendum / Extension till opening of the NIT. **Any such changes shall not be published through Press advt.**

For and on behalf of  
Bokaro Power Supply Company (P) Limited  
Sd/-  
**(J.M Prasad)**  
**AGM (P&C)**

## **Conditions & Rules to be observed in submitting Tenders**

### **1.01 Manner of Submission of the Tender**

The tender shall be divided into 04 parts as follows:-

- a) **Part A:** This part Comprises of Cost of Tender document, Proof of Qualifying Requirements along with a copy of latest Income Tax return Certificate and latest Sales / Service Tax return Certificate, copy of work orders executed, marked with (Part-A) ‘Qualifying Requirements’, NIT No. & date
- b) **Part B:** This part comprises of the Earnest Money Deposit in the manner as stated in the tender which shall be in one envelope marked with (Part-B) ‘EMD’, NIT No. & date
- c) **Part C:** This part Comprises of Technical and Commercial details, consent on special terms & conditions framed under Section – II etc. marked with (Part-C) Techno-Commercial Bid, NIT No. & Date.
- d) **Part D:** This part shall contain only the price schedule comprising the rates filled in figures and words as per the instruction given elsewhere in this tender. This should be kept in a sealed cover marked Price Bid (Part -D), NIT No. and Date.

1.01.1 Each part should be sealed in separate envelopes, clearly superscribing on the top of each envelope the relevant part number and description along with NIT reference and date of opening and submit all the parts simultaneously in another sealed envelope clearly superscribing NIT reference and date of opening.

### **1.02 Tender Validity Period**

The tender shall be valid at least for 90 (Ninety) days from the date of opening.

### **1.03 General**

- i) Tenderer’s are requested to visit site for actual assessment of the job before submission of their offer.
- ii) The tender rates shall be written in English, both words and figures. In the case of any discrepancy between the words & figures of the rates quoted, the rates expressed in words shall be taken as correct. In the case of discrepancy in the Unit Rate and Amount, Unit Rate will govern. Erasures, changes, and corrections of whatever type/nature shall be attested by the tenderer. The rates amount shall be written in Rupees and Paise only. The rates in words shall be written in one single line only without admitting any interpolations.
- iii) All pages of the tender documents, conditions, specifications & all enclosures must be signed with seal of the company at the lower left hand corner by the tenderer before submission of the tender.
- iv) If the intending tenderer is a Firm or Company, then they shall, in the forwarding letter, mention the number and names of all the partners & shall sign before submitting the same, unless the Power of Attorney holder has specifically been authorized in this respect.

- v) If any tenderer withdraws his tender before its acceptance or refuses within a reasonable time without giving any satisfactory and acceptable explanation thereof, the tenderer shall be disqualified for making any tender of the BPSCL for a minimum period of one year and the Earnest Money will be forfeited.
- vi) **Handling of Earnest Money:**
  - a) Earnest Money will be refunded to the un-successful tenderer after finalisation of tender and no interest will be paid for the same.
  - b) The amount of Earnest money will be adjusted against Security Deposit only in case of successful Tenderer.
- vii) In case the date of tender opening happens to be holiday, the tender will be opened on the next working day at the same time.
- viii) **Any conditional offer or offer having deviations from our qualifying requirement, specification & instruction sheets is liable to be rejected.**
- ix) BPSCL reserves the right either to reject any/all the tenders without assigning any reason thereof.

**General Terms and Conditions**

- 2.01 You will have to follow and observe the safety & statutory requirements.
- 2.02 You will have to fully responsible for any sort of unsafe activity of your workmen.
- 2.03 All working personnel should have proper safety certificates issued by BPSCL before start of work.
- 2.04 Supervision of the work has to be carried out by the agency.
- 2.05 All the working tools & tackles, men, material, welding machine etc., safety appliances like safety helmet, safety boot, hand gloves and personnel protection equipments like earplugs, masks are to be provided to the labours by you at your own cost. All safety appliances of reputed make are to be provided by you for your workers in presence of AGM(P&A) & Safety Officer of BPSCL. The list and make of safety appliances may be obtained from safety officer
- 2.06 Work is to be carried out as per instruction & satisfaction of the Engineer-In-Charge.
- 2.07 Rates are to be quoted on firm price basis. Any conditional offer is liable to be rejected.
- 2.08 **Payment Terms :**
  - I) a) 90% of contract value will be paid on pro-rate basis on progressive job duly certified by Engineer In – charge.  
b) Balance 10% will be retained as security deposit which will be released after 06 months of successful completion of work / guarantee period / maintenance period as applicable. **‘OR’**
  - II) **100% Payment** will be done on pro-rata progress of work to the satisfaction of the Engineer-in-charge subject to submission of security deposit value, which will be released after successful completion of the guarantee period.
- 2.09 Safety of the contractors workmen will be entirely the responsibility of the contractor. In case of any work injury, major or minor, the contractor or his representative will have to provide the medical aid. If adequate medical care is not provided by the contractor, the worker will be treated in BGH and the cost of treatment will be recovered from your running bill.
- 2.10 Contractor will produce medical fitness certificate for his workers prior to CLC clearance for working at height. Height passes to be obtained from safety department.
- 2.11 You will have to strictly adhere to the provision of various labour laws including payment of bonus Act 1965.
- 2.12 Offer is to either type written or by handwritten and in no case partly type written and partly hand written. No corrections, overtyping shall be permitted. If so, the same shall be summarily rejected.
- 2.13 Tenders shall be accompanied by a copy of latest IT Return submitted, Sales / Service Tax registration number of the Individual / Party/Firm submitting the tender.
- 2.14 Paying authority – Asstt. Manager (F&A), BPSCL.
- 2.15 Tenderers shall quote their firm rates and no negotiations will be held except with the lowest tenderer, if required.
- 2.16 In accepting the order you are understood to accept to all responsibilities for completing the work in all respect.

2.17 Where a claim of Service Tax is preferred and admitted, the tenderer must satisfy that he is a registered contractor under Service Tax Act and Possesses a Certificate of Registration in the firms name in which the service is made and shall in proof thereof, while submitting bills for payment, furnish the number, date and other particulars of such Certificate.

2.18 **Security Deposit :** The successful tenderer will have to deposit as security, for satisfactory execution of the work order, an amount equivalent to 10% of the total value of the order in any form, Bank Draft/ Bankers Cheque in Favour of Bokaro Power Supply Company (P) Ltd., B.S. City **within 30 days of placement of work order.**

The expression satisfactory execution of the order shall mean fulfillment of all obligation arising out of and the guarantees stipulated in the contract. In default at satisfactory execution of the order the security deposit shall be forfeited to the BPSCL.

Any penalty for which the successful tenderer shall be found liable or any liquidated damages which shall be payable to the BPSCL in terms of the Contract, shall also be recoverable by the BPSCL from the Security deposit. If such security deposit will not be adequate for the purpose of liquidating the amount of penalty and/or damages as contemplated, the amount in excess thereof shall be deducted from any sum or sums which may be due or may become due to the successful tenderer from the BPSCL on any account whatsoever.

Notwithstanding what has been stated above if the successful tenderer shall have duly performed all his obligation under and the guarantees stipulated in the contract and observe all the terms and conditions thereof and no penalty shall have been recoverable from him and / or the BPSCL shall not have suffered any damages whatsoever, then security deposit shall be refunded, on receipt of a certificate from the Engineer in - charge that there is no claim against the Successful tenderer under the Contract.

- i) **The Parties should clearly indicate their prices firm in all respects till execution of the work order.**
- ii) In case of asking any variation on any account whether sales tax or Service tax, excise duty or transportation etc. will not be treated as firm price on that account and hence parties should state everything clearly.

**Special Instruction:** Tenders must signify their willingness to submit security deposit. Tender will be opened on **09.07.2010 at 03.30 PM**. If it is declared a holiday by BPSCL then in the next working day at the same time in the presence of Tenderer's Authorized Representatives, who wish to be present.

**SCOPE OF WORK**

The agency has to plan, perform & supervise all electrical testing activities of all the electrical drives & equipments (electrics) of the entire Power Plant of BPSCL. The electrical testing will include any measurement of electrical parameters or calibration of meters. Also, the agency will have to check periodically, supervise effectively, and maintain efficiently the healthiness and trouble-free working of all the protection & signaling circuits of all electrics of the entire Power Plant.

The agency is to engage a centralized group comprising of at least Two (02) testing engineers, Four (04) supervisors/senior technician, Four (04) electrician & Four (04) attendants / helpers. This groups will have to execute the testing & related jobs either in the Electrical Testing Laboratory, or at the site, as directed by the Engineer I/c of BPSCL, normal working of the group will be for Eight (08) hours matching with general shift timing, but in cases of breakdown repairs & commissioning jobs, etc the same group will have to report at odd hours and work round the clock, if so demanded by the plant conditions as per the directives & full satisfaction of Engineer I/c. The activities of the centralized group are detailed below:

**A) Electrical Testing**

Following tests are to be conducted for different types of electrics:

**i) Motors (HT & LT)**

- 1) Measurement of insulation resistances (IR & Polarization Index) (PI) values by 2.5 KV Megger and / or 5KV/10KV Power Megger.
- 2) Measurement of winding resistances / inductances value for which each phase to phase combination.
- 3) Polarity test of Stator Winding.
- 4) High Voltage test as per standard norms.
- 5) Control test at normal voltage.
- 6) Low Voltage trial.
- 7) Measurement of RPM
- 8) Measurement of vibration parameters & temp profiles of bearing, winding etc while in operation & subsequent analysis.
- 9) Checking of protection & signaling details. Checking by simulation, if needed. Rectifying defects, if any by proper wiring and / or repairing defective relays, timers, meters, signaling lamps etc.
- 10) Commissioning tests after C/R.
- 11) Tan Delta Test for dielectric dissipation factor.

**ii) Generators**

- 1) Measurement of IR, Absorption Co-efficient & PI of stator / rotor of generator & exciter by 500 V / 1KV/2.5KV/5KV/10KV Megger.
- 2) Measurement of winding resistance / inductance of stator / rotor of generator.
- 3) Polarity test of stator winding.

- 4) High Voltage test (AC / DC) of stator / rotor.
- 5) Checking of protection & signaling circuits: All the protection & signaling of the generator, including its excitation system are to be checked thoroughly at regular interval or at shutdown, rectifications of defects, if any , are to be done by proper wiring , minor repairs, replacements of parts etc.
- 6) Short circuits characteristic & open circuit characteristic of the generator.
- 7) Armature drop test, no load test of the self exciter, when required.
- 8) Polarity test of residual magnetism of self exciter, if any, correction of the same polarity, if found reversed, so as to build up proper excitation.
- 9) Tests & checks of Thyristor based or magnetic amplifier based excitation system or any modified version of such a system, as per standard norms & manufacturer's instructions.
- 10) Commissioning test of generator & excitation system / self exciter including regular and special test.

### iii) **Circuit Breakers (HT&LT)**

- 1) Measurement of contact resistances & contact travels, wherever applicable, of the main power contacts, or arcing contacts.
- 2) Measurement of closing time & opening time.
- 3) Checking of simultaneous closing of poles.
- 4) High Voltage test. Measurement of IR before and after High Voltage test.
- 5) Checking of operation in test position.
- 6) Checking of protection & signaling circuits including various interlocks, auto change over schemes, indications etc. rectifying defects, if any by proper wiring minor repairs, replacement of parts etc
- 7) Measurement of IR & Operating voltage test of surge diverters.

### iv) **Transformers**

- 1) Measurement of IR & PI of HT/LT windings.
- 2) Measurement of winding resistances at all taps at HT & LT windings.
- 3) Measurement of no load magnetizing current, magnetic balance (core).
- 4) Ratio test at all tap positions.
- 5) Back charging at secondary voltage.
- 6) Vector groups test.
- 7) Measurement of Tan Delta for Transformers of 10 MVA capacity & above.
- 8) Protection / Signaling checking.
- 9) Test of oil (BDV, moisture content, Flash point, Tan Delta (dielectric dissipation factor), resistivity (Sp. Resistivity), Acidity (Neutralization value), sludge contents (sediments), Interfacial tension, DGA, Furan content, Degree of Polymerization etc.)
- 10) Partial discharge detection through acoustic emission.
- 11) Infrared scan.
- 12) Recovery voltage test.
- 13) Frequently voltage test.

14) Step voltage measurement.

**v) Isolators**

- 1) Measurement of contact resistance.
- 2) HV test.
- 3) Measurement of IR.
- 4) Interlock checking.

**vi) Current Transformers**

- 1) VI characteristics.
- 2) Ratio test at rated primary current.
- 3) Polarity
- 4) Knee point voltage.
- 5) HV test as per norms.
- 6) Measurement of IR.

**vii) Potential Transformer**

- 1) VI Characteristic.
- 2) Ratio test at suitable voltage.
- 3) Polarity.
- 4) HV test, through back charging at rated secondary voltage, if so needed.
- 5) Measurement of IR.

**viii) Lightning Arrester**

- 1) DC HV Test & measuring of leakage current.
- 2) AC HV Test & measuring of Flashover voltage.
- 3) Measurement of IR before & after HV test.

**ix) Bus Bars & Bus Ducts**

- 1) Measurement of IR.
- 2) HV Test.
- 3) Checking of protection system.

**x) Cables**

- 1) Continuity
- 2) Measurement of IR / PI
- 3) DC HV Test
- 4) Fault location by VI method / Fault locator.

**xi) Meters**

- 1) Testing & calibration
- 2) Minor repairs.

**xii) Relays**

- 1) Testing
- 2) Co-ordination
- 3) Minor repairs

**xiii) DC Motors / Generators**

- 1) Measurement of field resistance, inductance.
- 2) Field joint drop test.
- 3) Field polarity test.
- 4) Armature drop test.

- 5) Residual Magnetism check & build up (for Self Excited Generators)
- 6) Measurement of RPM at various conditions.

**xiv) Earthing**

- 1) Measurement of Earth resistance of Earth Pits & Grid.
- 2) Measurement of resistance in the Earth path for equipment Earthing.

**xv) Miscellaneous**

- 1) On line temp. measurement of power joints by remote sensors.
- 2) Measurement of IR & operating voltage test of surge diverters.
- 3) Measurement of IR for reactors & HV Test.
- 4) Measurement of IR for insulators (HT & LT).
- 5) Checking of Motor – generators sets.
- 6) Testing of inverters.
- 7) HV test of Instrument, Tapes, Appliances etc.
- 8) Any other test of any other drive / equipments which may be necessary.

**xvi) Special Test**

In special cases, any special test will have to be conducted on any electrical drive or equipments as directed by the Engineer I/c of BPSCL.

## **B) Checking of Protection & Signaling Circuits.**

- 1) Protection circuits of all the drives and electrical equipments are to be checked thoroughly in detail, with special attention to various electrical interlocking, tripping, supply auto change over schemes etc. Defects, if any are to be rectified by correcting problems of wiring, replacements of defective spare parts, minor repairs etc.
- 2) Signaling circuits of all the drives & electrical equipments are to be checked thoroughly in detail, with special attention to flag operation, indications, annunciations etc. Defects, if any are to be rectified by correcting problems of wiring, replacement of defective spare parts, minor repairs etc.
- 3) Regular check, especially at the various shut-down following the preventive maintenance schedule of each drive/equipments, are to be performed as per the Point # 1 & 2 above, and defects, if any, are to be rectified.
- 4) Simulation technique is to be adopted, wherever needed, to facilitate jobs pertaining to Point # 1 & 2 above.

The following electrical systems & aspects are to be thoroughly checked so far as protection & signaling circuits are concerned.

### **i) 138 KV Lines & Bushes**

- a) Checking of relays, other protective devices & protection system as whole.
- b) Checking of signaling/ annunciation & signaling system as whole.
- c) Rectifying defects, if any.
- d) Ensuring trouble free & reliable operation of protection / signaling system as whole.
- e) Fault analysis, in case of operation of protection system.
- f) Submission of report.

### **ii) 11.9 KV Lines & Bushes / Sections**

- a) Checking of relays, other protective devices & protection system as whole.
- b) Checking of signaling / annunciation & signaling system as whole.
- c) Rectifying defects, if any.
- d) Ensuring trouble- free & reliable operation of protection / signaling systems whole.
- e) Fault analysis, case of operation of protection systems.
- f) Submission of report.

### **iii) 6.9 KV Feeders & Bus Sections**

- a) Checking of relays, other protective devices & protection system as whole.
- b) Checking of signaling / annunciation & signaling system as whole.
- c) Rectifying defects, if any.
- d) Ensuring trouble- free & reliable operation of protection / signaling systems whole.
- e) Fault analysis, case of operation of protection systems.
- f) Submission of report.

### **iv) LT Feeders & Bus Sections**

- a) Checking of relays, other protective devices & protection system as whole.
- b) Checking of signaling / annunciation & signaling system as whole.
- c) Rectifying defects, if any.
- d) Ensuring trouble- free & reliable operation of protection / signaling systems whole.
- e) Fault analysis, case of operation of protection systems.
- f) Submission of report.

### **v) DC Systems**

- a) Location & removal of Earth fault.

- b) Ensuring all round healthiness of the protection & signaling circuits of the system, and related trouble shooting.
- c) Ensuring healthiness of the protection & signaling circuits of the MG- sets, inverters, chargers, etc and related trouble shooting.

**vi) All Electrical Drives & Equipments**

- a) Checking of relays, other protective devices & protection system as whole.
- b) Checking of signaling / annunciation & signaling system as whole.
- c) Rectifying defects, if any.
- d) Ensuring trouble- free & reliable operation of protection / signaling system as a whole.
- e) Fault analysis, case of operation of operation system.
- f) Submission of report.

**vii) Co-ordination among protection systems**

- a) Ensuring proper co-ordination among the protection system of the Power Plant of BPSCL & the protection system of the external grids (e.g. grids of DVC, DNW of Bokaro Steel Plant, etc) at all voltage levels.
- b) Ensuring proper co-ordination among all the various protection system inside the Power Plant of BPSCL at all voltage levels.
- c) Clearance of fault, if any, anywhere in the system of the Power Plant of BPSCL, or outside it, selectively, effectively, in the quickest possible time, not allowing the fault to penetrate inside the healthy portion of the system.
- d) Ensuring back-up protection in stages, in case of failure of primary protection.

**viii) Work Co-ordination with outside agencies.**

As the Power Plant of the BPSCL has a number of inter-connections with the network of DVC & Bokaro Steel Plant at various voltage levels, our protection system function in coherence with others. To achieve this, the testing & protection group of BPSCL will have to work with close co-ordination with-

- 1) DVC (Damodar Valley Corporation)
- 2) ETL Department of Bokaro Steel Plant
- 3) DNW Department of Bokaro Steel Plant
- 4) ETB Department of Bokaro Steel Plant.

**C) Condition Motoring**

**i) Conditions Motoring of Motors in-site conditions:**

**ON-LINE**

- a) Electrical Current Signature analysis.
- b) Acoustic Emission Analysis / Ultrasonic Testing.
- c) Vibration Specterm Analysis.

**OFF-LINE**

- a) Tan Delta & Capacitance Analysis.
- b) Dielectric Discharge Analysis.
- c) Motor Circuit Analysis.

## **ii) Conditions Monitoring of Transformers**

### **Visual Inspection**

- a) Oil leakage from various joints.
- b) Conditions of breather, pumps, fans, temperature indicators, pressure release valves etc.
- c) Past history and if it any time the transformer has tripped on differential / GOR/OSR.

### **Test on Oil & Paper**

- a) Color and purity (visual), BDV, Moisture content, Flash point, Tan Delta (Dielectric dissipation factor), resistivity (Sp. Resistivity), Acidity (Neutralization value), Sludge contents (sediment), Interfacial tension, DGA.
- b) Furan Content: To observe the insulation degradation of in-service Transformers.
- c) Degree of Polymerization: To determine the condition of paper insulation.

### **Electrical Tests:**

As detailed in Transformer test given above

- a) IR & PI values measurements with 2.5/5KV motorized megger.
- b) Low Load Magnetizing Current.
- c) Core Balance
- d) Ratio Test on all taps.
- e) Winding Resistance.
- f) Capacitance & Tan Delta of the Transformer Winding / Bushing.
- g) Partial Discharge Detection through Acoustic Emission.
- h) Infrared Scan
- i) Recovery Voltage Test.
- j) Frequency Voltage Test
- k) Step Voltage measurement.

## **iii) Condition Monitoring of Generators**

Standard techniques of conditions monitoring like vibration analysis, etc to be taken up regularly long with regular physical inspection and other tests as already mentioned above.

## **iv) Condition Monitoring of other Drives / Equipments:**

All the other drives/ equipments are to be inspected regularly & their condition monitoring should be done as per standard case – specific norms like vibration analysis, various tests already mentioned above etc.

## **D) Attending Breakdown, if any**

In case of any breakdown occurring at the Power Plant, the health of various electrical equipments will have to be tested as per norms, at odd ours and round the clock, so as to identify the faulty electrics, normalize the unaffected electrical system as soon as possible & ascertain the extent of maintenance to be done on the equipments suffering breakdown. At the time of normalization of the faulty electrics after maintenance tests / checks are again to be performed to assure their healthiness, again an odd hours and round the clock, if it is needed.

## **E) Commissioning, if any**

At the time of commissioning of an important drive or equipment after it is installed, maintenance, repair etc testing & checking activities are to be conducted round the clock ,at off hours, if it is so needed.

**F) Report of Test Results, Checks etc & Analysis of results, issue of Test/Calibration certificates.**

- a) All the test results are to be regularly logged & systematically recorded in a neat tabular form along with relevant remarks.
- b) All the various checks of inspection & protection / signaling circuits are to be regularly recorded for each electrical drive & equipments tested.
- c) Calibration certificate are to be issued by the agency for meters calibrated.

**Schedule of Electrical Drives / Equipments of BPSCL**

Sl.No.	List of Equipment	Quantity
01	6.6 KV HT Motor	114 Nos
02	LT Motors	LOT
03	Generator 12 MW	01 No
04	Generator 55 MW	02 Nos
05	Generator 60 MW	03 Nos
06	138 KV Circuit Breaker	14 Nos
07	11.5 KV Circuit Breaker	42 Nos
08	6.9 KV Circuit Breaker	242 Nos
09	LT Circuit Breaker	309 Nos
10	Generator Fied Breaker	06 Nos
11	50 MVA Transformer	02 Nos
12	80 MVA Transformer	03 Nos
13	10MVA Transformer	09 Nos
14	Excitation Transformer	03 Nos
15	S/S Transformer	29 Nos
16	Peterson Coil Transformer	05 Nos
17	138 KV Isolator	46 Nos
18	6.9 KV/ 11.5 KV Isolator	34 Nos
19	415 V Isolator	71 Nos
20	138 KV CT	44 Nos
21	11.5KV / 6.9 KV & LT PT	LOT
22	138 KV PT	15 Nos
23	11.5 KV / 6.9 KV & LT PT	76 Nos
24	138 KV LA	36 Nos
25	11.9KV / 6.9 Bus Section	04 Nos
26	6.9 KV Bus Section	16 Sets
27	415V Bus Section	26 Sets
28	11.9 KV Bus Duct	20 Sets
29	11.9 KV Reactor	75 Sets
30	HT & LT Cables	LOT
31	Meters	LOT
32	Relays	LOT
33	Energy Meters	LOT
34	Unit – 9 Drives / equipments / systems	LOT
35	Any future expansion units Drives equipments / systems	LOT

**Further Classification**

A) i) 8) Vibration measurement shall be done and inference drawn.

A) i) 9) & 10 : These points will be taken up by the agency with adequate support from BPSCL, other relevant departments like ETL, ETB of Bokaro Steel Plant (BSL) as regards technical support documents, history book. Spares and exchanges of knowledge. BPSCL shall co-ordinates with other concerned of BSL on this issue.

A) iv) 10 to 14: These tests are already covered under condition monitoring and the same shall be carried out accordingly and not under routine testing of the Transformer.

A) v) to A x): HV test will be limit to 70KV AC or 80KV DC.

A) xi): The energy meter testing / calibration may not be possible at site in situ conditions and if required, the energy meters may be taken outside the plant premises for the same.

A) xvi): If any special tests are to be carried out, the same shall be carried out with adequate support from BPSCL, and relevant manufactures of the equipments, if required, which will be arranged by BPSCL.

All spares required for the equipments for protection, signaling and metering will be provided by BPSCL.

B) 1 & 2: The minor rectification of defects / problems shall be attended by the site deployed staff only. In case the problem persists, the specialist shall be arranged by BPSCL.

C) i): The condition monitoring of Critical Motors shall be carried once in a year.

C) ii): The condition monitoring of Transformers of 10MVA & above to be carried once a year.

C) iii) & iv): The condition monitoring of the generators and drives will be done by Vibration measurement and interference drawn after physical inspection at regular intervals.

#### **Schedule of Electrical Drives / Equipments of BPSCL**

Sr. No.35: Any future expansion, addition, deletion of equipments shall be mutually discussed and settled considering technical and commercial aspects.

**Special Condition to be followed on job :**

- 1) You have to engage a centralized group comprising of least Two(02) testing engineers, Four(04) supervisors / senior technical , Four (04) attendants/ helpers. Weekly rest /leave etc. are to be managed as per the direction of the Engineer I/c of BPSCL in such a way that the job never suffers. In any case, the total skilled manpower strength present on any given day, i.e. the total number comprising of testing engineers, supervisors & electricians (excluding attendants) should at least be Eight (08).
- 2) One specialist Testing Engineer engaged by you will visit the Power Plant of BPSCL for any specific problem solving, special test, commissioning etc , if such a job can not be handled by the personnel already engaged at site.
- 3) This group will have to execute the electrical testing / checking & related jobs either in the Electrical Testing Laboratory, or at the site, as directed by the Engineer I/c of BPSCL.
- 4) Your men, deputed for the execution of the job must be competent enough to execute the job confidently and successfully.
- 5) Normal working of the group will be for Eight (08) hours matching with General Shift timing of BPSCL. In exceptional cases of breakdown repairs, faults in electrical system, commissioning jobs, normalization of important equipments, etc the same group will have to report even on rest days / holidays or at odd hours and will have work round the clock, if so demanded by the plant condition. In such cases, the working group may also be asked to report in morning/evening/night shifts duty as per BPSCL timing and may have to work overtime beyond the usual timing .In this regard the instruction of the Engr.I/c BPSCL will be final & abiding.
- 6) During any case of urgency, exigency or emergency in the plant, as described in Clause # 5 above, the working group engaged by the agency will have to report at the site immediately after being called by a BPSCL engineer. There should not be any delay to report, of more than Ten (10) minutes, if the group is already inside plant premises, or of more than Forty Five (45) minutes, if the group is being called from outside township.
- 7) For the condition monitoring, special test by special instruments will have to be performed at least once in year.
- 8) In case of any dispute(s), the decision of the Engineer I/c of BPSCL will be final & abiding as far as any technical job is concerned.
- 9) The agency will be solely responsible for maintaining safety rules and standard practices during the performance of the job. The agency will have to commit that no untoward / illegal incident / accident or safety-rule violation will occur during the performances of the job by their appointed officers / workmen. In case of any such incident/accident, the agency will be solely responsible.
- 10) All the activities, tests etc are to be carried out by the agency safely as per standard procedures without any possibility of danger to the working personnel, or of damage to the electrical drive or equipments, or any parts thereof.

- 11) Excepting cases of “Force Majeure”, any other damages of the electrical drives, instruments, equipments, or parts thereof, belonging to BPSCL, during testing/checking activities. The agency is to repair or replace the damaged parts free of cost.
- 12) All the testing instruments / equipments etc are to be arranged for & transported by the agency to & from the site.
- 13) All types of tools & tackles are to be supplied by the agency.
- 14) All the safety appliances are to be supplied by the agency to the personnel engaged by them.
- 15) BPSCL will provide only the following: Space, Water, LT Power, Site Office, Room, Canteen facilities (on direct chargeable basis). Rests of the resources are to be arranged by the agency.
- 16) The agency will make its own arrangement for transport & accommodation of its personnel engaged at site
- 17) BPSCL does not maintain any security staff of its own. The agency bidding for the job, will have to bear the full responsibility of the security & safekeeping of all the instruments, testing kits, tools/ tackles, or any other valuables being used by it & kept under its custody, round the clock ,Twenty Four (24) hours a day, Three Hundred Sixty Five (365) days a year, through out the whole contract period. The insurance of the valuables possessed by it against any kind of damage, theft etc will also be the responsibility of the agency.
- 18) The agency should provide the service of performing the entire job on single responsibility basis.
- 19) All incidental items of work not shown or specified but reasonably implied and found to be necessary for successful completion of the work shall be deemed to be included in the scope of work at no extra cost to BPSCL.
- 20) In special cases, any special tests are to be conducted on any electrical drive or equipments as directs by Engineer I/c of BPSCL.
- 21) The duration of the entire job will spread over Twenty Four (24) months, for which the agency will have to perform the job regularly, planning & executing the schedule fixed by the Engineer I/c of BPSCL for each day.
- 22) The report of the job done is to be logged every day with test results noted in a neat tabular form, supplemented with analyses & remarks.
- 23) Defects rectification of the protection & signaling circuits is to be done by the agency including minor repairs.
- 24) Special instruments for special tests or conditions monitoring are to be provided by the agency & may be made available at the time of such tests or conditions monitoring .It is necessary to keep these special instruments idling at the site for rest of the time.
- 25) The personnel engaged by the agency will have to abide by the rules & regulations of BPSCL in force, as regards to such a contractual job.

- 26) Different relevant materials like circuit diagrams, documents, manuals test reports, relay setting, etc will be made available to the agency through the Departments like ETL, ETB etc of Bokaro Steel Plant.
- 27) The agency is to provide properly authenticated copies of certificates, issued by competent & registered institutions, ensuring latest & perfect calibration as per norms of all the testing instruments being used by them.
- 28) After testing the various electrical drives & equipments of BPSCL, and calibrations of meters, the agency has to issue certificates for the same.
- 29) Properly authenticated copy of registration certificates of the agency enabling it to perform all types of electrical tests & issue test/calibration certificates should be provided along with its bid for the job.
- 30) The price bid of the offer for the job should separately show the hire charges of the electrical testing instruments provided by the agency.
- 31) A review of the job-contract will be done after one year on the basis of actual performance of the agency doing the job. Also, the review will be done after One (01) year to take into account of the testing instruments being procured by BPSCL and in case of an availability of the in-house instruments, the hire charges for the electrical testing instruments provided by the agency will be deducted from the amount payable for the rest of the time duration.
- 32) The bidder must submit a list of engineer & technicians to be employed by it for the proposed job, along with their qualification & number of years of experience in the field of electrical testing instruments provided by the agency.
- 33) Preferences will be given to bidder having experience of manufacturing of protective relays of electrical systems. Proof of the same is to be furnished in form of printed materials duly authenticated, like brochures, booklets etc depicting general & technical description of the manufactured items.
- 34) The bidder should be an engineering organization & an authenticated declaration to this effect is to be submitted by the bidder.
- 35) Different terms & conditions mentioned by the bidders in their offers will not have any validity or applicability for actual execution unless these are clearly accepted by BPSCL and categorically mentioned in the Work Order awarded by BPSCL.
- 36) As this job is of purely engineering nature, permission will not be granted to sublet the technical part of the job in full or part thereof, except the unskilled-labour-intensive part of the work.
- 37) Properly authenticated copy of registration certificate of the agency enabling it to perform all types of electrical tests & issue test / calibration certificates should be provided.
- 38) All the materials required for the job are to be supplied by you.
- 39) You will have to be fully responsible for any sort of unsafe activity of your workmen.
- 40) If the performance of the party found satisfactory as per Engineer I/c then the contract may be extended for another One (01) year at the same rate, terms & conditions on mutual agreement basis.**

**Special Terms & Conditions :**

1) For attending the job, you have to provide all categories of manpower with necessary tools & tackles.

**2) Safety Training & Safety Clearance**

All unskilled & skilled workmen, supervisors & engineers of the contractor must undergo safety training conducted by Safety Engineering Department of BPSCL and obtain certificate from there, without which they will not be allowed to work.

**3) Supply and use of safety equipments**

All the safety appliances and personnel protection equipments are to be provided by you to your men at own cost. Your men must use the safety equipments as per the requirement without fail.

**4) Observation of safety rules**

a) It is your responsibility to comply with all the safety rules and regulations applicable in the plant area. Ignorance of safety rules and statutes will not be in valid excuse.

b) Your employees will have to strictly observe safety rules and comply with statutory requirement concerning the safety given in Annexure – III. Any violation thereof by any employee will expose you to penalty

**5) Medical fitness of employees**

You will have to ensure proper medical fitness of the employees employed by you.

**6) Work Accident**

You will be totally responsible for the safety of the workers employed by you. In the event of any work accident, major or minor, your representative must take care of the injured person immediately and provide him the required treatment suggested by the doctor. The injured can be admitted to BGH also for treatment by paying the charges demanded by the hospital authority.

**7) Gate Pass for contractor's employees**

For your employees, you will have to arrange necessary gate passes after fulfilling the formalities laid down by the pass section authorities.

**8) Work Permit**

As the area is highly sensitive with respect to safety hazards, the responsible supervisor / engineer of the contractor must take proper work- permit, shut down clearance and other instruction from the Engineer I/c daily before start of the work.

**9) Compliance with various labour laws**

You have to comply with various Labour Laws & ESI Act & EPF rules etc applicable in the Plant area.

**10) Coverage Area**

The list of equipments and area to be covered under this contract are given under the heads of details of Scope of Work (Annexure – I).

**11) Innovativeness**

If any breakdown occurs it is to be analyzed to find out its root cause. Once the cause is identified, its remedial measure is also to be thought incorporated so that a similar breakdown does not occur again.

**14) Guarantee Period:**

You have to certify a guarantee of Six (06) months of workmanship & reliability of test results.

**13) Job Planning & Scheduling**

a) After assessing the total quantum of work, job planning and scheduling will have to be done on quarterly, monthly and daily basis so that job- fulfillment target is achieved hundred percent.

b) Planned shutdown may not be available sometime due to unfavorable plant condition. But, this should not be the same reason for sitting idle. Using the creative thinking, the Site Engineer of the contractor will have to come forward with alternative work proposal so as to keep the wheels always moving and marching ahead.

**14) Preservation & Custody**

Dismantled parts of equipments will have to be kept in clean container covered properly. Safety against theft and pilferage of all equipments coming under the job-jurisdiction will be responsibility of the contractor.

15) The rotor may be taken to your premises for the job as mentioned in Scope of Work.

16) The final Scope of Work change & will be decided upon by joint inspection of the condition of rotor after Inspection and or partial dismantling of rotor.

17) All materials / spare to be used by you should be of proper technical specifications like insulation material of "F" .Varnish etc of Dr. Becks make.

18) You have to put a Quality Assurance Plan after award of Work Order which will be seen & approved by the Engineer I/c.

19) You have to arrange Lloyds register Inspection, the expense of which will be borne by BPSCL.Any delay in Lloyds Register Inspection will be treated as on your Account only.

**A) PENALTY**

If the work is delayed beyond contractual period, a penalty @ ½% of contract value per week for delayed portion subject to maximum limit of 05% of contract value will be deducted from bills.

**B) PENALTY CLAUSE FOR NON ADHERENCE OF SAFETY NORMS / ITEMS.**

i) You have to depute at least Two (02) experienced Engineer I/c as overall Site Manager, normally both should be present. Occasionally, one Engineer I/c may be present on a day with special permission from BPSCL.If both the Engineers I/c not present during day, penalty of Rs 5000/- will be deducted per day ( of Eight ,08 working hours) of such absence , from the final payment demanded by the agency.

ii) For the group engaged by the agency, the minimum strength of the skilled manpower present on any particular day is Eight (08), excluding the attendants. If the skilled manpower strength goes

below (Eight) any day , a penalty charge of Rs 2000/- per man per day ( of eight, working hours) of absence , will be deducted from the final payment demanded by the agency.

iii) Non completion or delayed completion of any work beyond a reasonable time schedule fixed by the Engineer I/c of BPSCL will expose the job contractor to financial penalty as determine by the loss of production and / or equipments – damage that may result owing to such time delays.

iv) In case of urgent jobs, exigencies or emergencies in the plant, any failure or delay of then working groups engaged by the agency, to reach the site beyond a reasonable time after being called, as defined by Clause # 6 of the special conditions given above, will expose the job-contractor to the financial penalty by an amount of Rs 5000/- for every such occasion of delay.

v) If any work is adversely affected due to non – availability of any testing kits, instruments, tools & tackles , etc to be provided by the agency , it will expose the job-contractor to financial penalty as determine by the loss of production and / or equipment-damage that may result owing to such non – availability.

vi) In case of mal – operation or non – operation of the protection circuit of an electrical system, checked & certified earlier to be right by the agency, the job – contractor agency will be exposed to financial penalty as determined by the loss of production and / or equipment – damage that may result owing to such mal-operation / non-operation.

vii) In addition to above, if any act of omission ,negligence and lack of expertise is detected in the responsibility area, it will expose the contractor to penalty charges.

viii) Excepting cases of “Force Majeure”, any other damages of the electrical drives, instruments, equipments, or parts thereof, belonging to BPSCL, during testing / checking activities. The agency is to repair or replace the damage parts free of costs.

ix) Violation of safety will be penalized as per annexure attached for safety.

## **Safety**

For attending the job, you have to follow the following safety rules & regulations -

### 1) Safety Training & Safety Clearance

All unskilled & skilled workmen, supervisors & engineers of the contractor must undergo safety training conducted by Safety Engineering Department of BPSCL and obtain certificate from there, without which they will no be allowed to work.

### 2) Supply and use of safety equipments

All the safety appliances and personnel protection equipments are to be provided by you to your men at your own cost. Your men must use the safety equipments as per the requirement without fail.

### 3 Observation of safety rules

a) It is your responsibility to comply with all the safety rules and regulations applicable in the plant area. Ignorance of safety rules and statues will not be a valid excuse.

b) Your employees will have to strictly observe safety rules and comply with statutory

requirement concerning the safety. Any violation thereof by any employee will expose you to penalty

5) Medical fitness of employees

You will have to ensure proper medical fitness of the employees employed by you.

6) Work Accident

You will be totally responsible for the safety of the workers employed by you. In the event of any work accident, major or minor, your representative must take care of the injured person immediately and provide him the required treatment suggested by the doctor. The injured can be admitted to BGH also for treatment by paying the charges demanded by the hospital authority.

7) You have to obey the safety clauses circulated by BSL / SAIL as given below -

- 1) Without prejudice to the right conferred by the clause above for stoppage of work for violation of safety requirements, contractor shall be liable for penalties mentioned below-
  - i) Upto Rs 5000/- by DGM (Safety)/ Head of Safety Engg. Dept. / HoD where work is being done for 1<sup>st</sup> violation of safety norms, on use of PPEs (Personal Protective Equipments) like safety shoes, hand gloves, safety helmets, goggles etc as per work requirements by the contractor or his workers. This condition is applicable in case of violations of road safety norms also.
  - ii) Fine upto Rs 20,000/- on 2<sup>nd</sup> violations as mentioned in Clause No – 11(i) above.
  - iii) The contractor shall be debarred for One (01) year / deregister from taking up the further contractual work in BPSCL from the date of issue of debarring / deregistering order on 3<sup>rd</sup> violations as mentioned in Clause No -11(i) above.
  - iv) Fine upto Rs 10,000/- for violations in use of full body harness by the contractor or his workers for working at height (above 1.8 meter from immediate floor).
  - v) Fine Rs 25,000/- minimum to Rs 50,000/- maximum for serious injuries and disabilities cause by violations as mentioned in Clause No – 11(i) & 11(iv).
  - vi) Independent of the above the contractor shall be fined Rs 1, 00000/- (Rs One Lakh) or more and debarred / deregister for taking further contractual work in BPSCL from the date of issue of debarring / deregistering order in case any fatal accident occurs due to the violations as mentioned in Clause No – 11(i) & 11(iv).

**Suggested List of Testing Instruments to be provided by you. :**

- 1) Insulation Tester 500/1000, 2500 V / 5000V (Motorized) with Timer and Battery Backup.
- 2) Tong Tester, Analog / Digital 0-2000mA.
- 3) Milli Amps. Digital Tong Tester,0-5000mA.
- 4) Multimeter Digital & Analog AC/DC.
- 5) Avo Meter (Motwane /AVO make).
- 6) Winding Resistance Meter (Scope make)
- 7) Digital Thermometer with Probe.
- 8) Phase Sequence Meter.
- 9) DC Injection Kit for Contract resistance Measurement.100 Ams.(Scope make)
- 10) 3 Pole timer for Breaker Closing / Tripping measurement (Scope make)
- 11) Variac 240 V/15A, 1 ph.
- 12) Variac 440 V 5A, 3 ph
- 13) Secondary Inj. Test set 50A / 100 A.
- 14) Primary Inj. Test set 0-1500A/3000A.
- 15) HV Test set DC 120KV / 200 mA & AC 100KV / 200mA
- 16) Earth Resistance Meter.
- 17) Oil Testing Kit (0- 100KV).
- 18) Turns Ratio Meter.
- 19) Tan Delta Kit for Transformer Test
- 20) Miscellaneous items-
  - Grounding Rod / Distribution Board.
  - Power Tester
  - Power Distribution Boards
  - Torque Wrench
  - Electric Blower
  - Vacuum Cleaner
  - Ratchet Spanner 10-32 mm
  - Safety Helmets
  - Safety Belts
  - 3 Phase Main Switch,100 Amps
  - Single Phase Switch Board
- 20) Special Instrument(s) needed for special tests.

**Suggested Instrument List for Motor Condition Monitoring to be provided by the agency**

<b>Instrument</b>	<b>Make</b>
EMPATH Electrical Signature Analyzer	Framatome ANP,USA
ASCENT Dual- Channel Vibration Analyzer	Commtest Instrument, New Zealand
MHC-Memo Acoustic Emission Analyzer	Holroyd Instrument,UK
Model 2811 Tan Delta & Capacitance Analyzer	Tettex Instruments, Switzerland
MI 2077 Teraohm Dielectric Analyser	Metrel d.d. ,Slovenia
All-Test IV Pro 2000 Motor Circuit Breaker	BJM Corporation,USA

Note: - Make of instruments may vary, with permission, in special cases.

**Suggested Special Instruments List for Transformer Condition Mentoring**

- 1) Capacitance & Tan Delta Test Set – 2809 / 2816, HV Source, Tettex, Switzerland
- 2) Std. Capacitor – 25 KV, 100 pF, Tettex.
- 3) Surge Comparison Tester: Make – Jab- BAL
- 4) Turns Ratio Meter- Make: Eltel.
- 5) Sweep Frequency Resource Analysis Set –Doble, USA.
- 6) Acoustic Emission Discharge Measurement – Make: Physical Acoustic, USA.
- 7) Partial Discharge Measurement – Make: MWB.
- 8) Recovery Voltage Measurement Test Set- ERDA Set.
- 9) Oil Testing – DGA (Lab. Instrument – Varian, USA).
- 10) Routine Tests on Oil – Various Standard Instruments.
- 11) Furan Test – HPLC Make: Waters USA.

Note: - Make of instruments may vary, with permission, in special cases.

**Schedule of Quantity**

<b>Sl. No.</b>	<b>Details of Work</b>	<b>Qty. (Nos.)</b>	<b>Rate/ Day (Rs)</b>	<b>Amount/ Month (Rs)</b>
01	Electrical Testing	Two (02) drives & One (01) major equipment per day on an average.		
02	Checking of protection & signaling circuits	Two (02) drives & One (01) major equipment per day on an average		
03	Condition Monitoring	Two (02) drives & One (01) major equipment per day on an average		
04	Attending breakdowns, if any	As per specific cases		
05	Commissioning, if any	As per specific cases		
06	Report of Test results, checks etc and analysis of results ,issue of test certificates, calibration certificates	Two (02) drives & One (01) major equipment per day on an average		
<b>Total</b>				
<b>Total Value for One Month</b>				
<b>Work Value for 24 Months</b>				

**(Rupees ..... ) only**

Note :- Service tax – **Extra** as applicable must be mentioned by the bidder clearly.