**ODISHA POWER TRANSMISSION CORPORATION LTD**

**OFFICE OF THE SENIOR GENERAL MANAGER,**

**CENTRAL PROCUREMENT CELL,**

**JANPATH, BHUBANESWAR - 751022**

# TENDER SPECIFICATION
## NO. Sr.G.M.-CPC –e-Tender-Telecom-RTU-46 /2018-19

## FOR SUPPLY, ERECTION & COMMISSIONING AND AMC OF RTU
**(E tendering mode only)**

| Sl | ITEM DESCRIPTION | UNIT | Total Qty. |
|---|---|---|---|
| 1 | **RTU Type-I** | **Set** | 60 |
| 2 | **RTU Type-II** | **No** | 18 |
| 3 | **Multi Function Meter, CMR, OLTC transducers, control cable of different specification** | As per BoQ | |

**Request for online tender documents – From dt- 25.01.2019 (10.00 AM) to dt- 21.02.2019 (12.30 PM)**

**Last date of submission of online tender : Dt. 22.02.2019 (12.30 PM)**

**Date of opening of Tender : Dt. 23.02.2019 (03.00 PM)**

**Pre-bid conference : Dt. 05.02.2019 (11.00 AM)**

**ODISHA POWER TRANSMISSION CORPORATION LTD.**

**REGD. OFFICE: JANPATH, BHUBANESWAR – 751 022,**

**ODISHA**

e-TENDER NOTICE NO. 46/ 2018-19

For and on behalf of ODISHA POWER TRANSMISSION CORPORATION LTD, C.G.M. [C.P.C.] invites Tenders from reputed manufacturers in India in two part bidding system for Supply and Erection & Commissioning and AMC of RTU

The interested bidders would be required to nrol themselves on the tender portal **www.tenderwizard.com/OPTCL**. Complete set of bidding documents are available at **www.tenderwizard.com/OPTCL** from 25.01.2019 at 10.00 A.M to 21.02.2019 at 12.30 P.M. Interested manufacturers may visit OPTCL's official web site **http://www.optcl.co.in** and **www.tenderwizard.com/OPTCL** for detail specification.

N.B:-All subsequent addendums / corrigendum to the tender shall be hosted in the **www.tenderwizard.com/OPTCL** only.

CHIEF GENERAL MANAGER [C.P.C.]

**NOTICE INVITING TENDER**

**ODISHA POWER TRANSMISSION CORPORATION LTD.,**

**REGD. OFFICE: JANPATH, BHUBANESWAR – 751 022,**

**ODISHA, INDIA.**

e-TENDER NOTICE NO- 46 /2018-19.

For and on behalf of the ODISHA POWER TRANSMISSION CORPORATION LTD., the undersigned invites bids from manufacturers under two-part bidding system in e- tendering mode only as per the following details.

| Tender Specification No. | Sl | Item description | Unit | Qnty | EMD in (Rs) | Cost of tender document in (Rs) | Tender Processing Fee (Rs) | Last date of receipt & opening of tender |
|---|---|---|---|---|---|---|---|---|
| **Sr.G.M.-CPC –e-Tender-Telecom-RTU-46 /2018-19** | 1 | **RTU Type-I** | No | 60 | 22,93,900.00 | 12,000/- (INR) + GST@12 %= 13,440/- | 5000/- (INR)+ GST@18 %= 5900/- | 22.02.2019 (12.30 Hrs) **&** 23.02.2019 (15.00 Hrs) |
| | 2 | **RTU Type-II** | No | 18 | | | | |
| | 3 | **Multi-Function Meter, CMR, OLTC transducers, control cable of different specification** | LS | As per BOQ | | | | |
| | | | | | | | | |

The bidders can view the tender documents from Tender Portal free of cost.

TENDER COST:

The bidders who want to submit bids shall have to pay non-refundable amount Rs. 13,440/- (Rupees Thirteen thousand four hundred forty) only including GST @ 12%) towards the tender cost, in the form of Demand draft/Pay order/Cash only, drawn in favour of the D.D.O Head Qrs, OPTCL, Bhubaneswar. They have to also submit notarized hard copy of GST registration certificate on or before the date & time of submission of techno-commercial bid.

TENDER PROCESSING FEE:

The bidders shall have to submit non-refundable amount of Rs.5,900/- (Rupees Five thousand nine hundred) only including GST @ 18%) towards the tender processing fee to K.S.E.D.C.Ltd, in e-payment mode. The e-payment of above amount is to be made to enable the bidder to down load the bid proposal sheets & bid document in electronic mode.

SUBMISSION OF TENDER COST, TENDER PROCESSING FEE & EMD:

The bidder shall deposit the tender cost, tender processing fee & EMD BG prior to last date & time for submission of bid as notified in tender notice.

**The demand draft/pay order for tender cost , processing fees are to be submitted along with the EMD at the office of the undersigned on or before the last date & time of submission of tender.**

The bidders shall scan the Demand Draft/Pay order/ Bank guarantee, towards EMD and upload the same in the prescribed form in .gif or .jpg format in addition to sending the original as stated above.

The prospective bidders are advised to register their user ID, Password, company ID from website **www.tenderwizard.com/OPTCL** by clicking on hyper link "Register Me".

Any clarifications regarding the scope of work and technical features of the tender can be had from the undersigned during office hours.

***Minimum qualification criteria of bidders: AS STIPULATED IN SECTION-II, (G.T.C.C) OF THE TENDER SPECIFICATION.***

**CHIEF GENERAL MANAGER,**

**CENTRAL PROCUREMENT CELL**
**FAX NO.:0674 – 2542964**
**TELEPHONE NO.:0674 – 2541801**

**ODISHA POWER TRANSMISSION CORPORATION LTD.**

**OFFICE OF THE CHIEF GENERAL MANAGER**

*CENTRAL PROCUREMENT CELL*

**JANAPATH, BHUBANESWAR – 751022**

# TENDER SPECIFICATION
## NO. Sr.G.M.-CPC –e-Tender-Telecom-RTU-46 /2018-19

**CONTAINING**

**PART – I**

| | | |
|---|---|---|
| **SECTION – I** | **:** | **INSTRUCTION TO TENDERERS** |
| **SECTION – II** | **:** | **GENERAL TERMS AND CONDITIONS OF CONTRACT ( G.T.C.C.) (COMMERCIAL)** |
| **SECTION – III** | **:** | **LIST OF ANNEXURES (COMMERCIAL)** |
| **SECTION – IV** | **:** | **TECHNICAL SPECIFICATION**<br>**Vol-I : Technical Specification of RTU & LDMS**<br>**Vol-II: Technical Specification for power & Control cable** |
| **SECTION – V** | **:** | **SPECIFICATION FOR AMC OF RTU & LDMS** |
| **PART – II** | | **PRICE BID.** |

## *PART – I.*

## SECTION – I.

## INSTRUCTIONS TO TENDERERS

**COMMERCIAL SPECIFICATION.**

**P A R T – I**

**S E C T I O N - I**

# INSTRUCTIONS TO TENDERER

**1. Submission of Bids:-**

The bidder shall submit the bid in Electronic Mode only i.e **www.tenderwizard.com/OPTCL**. The bidder must ensure that the bids are received in the specified website of the OPTCL by the date and time indicated in the Tender notice. Bids submitted by telex/telegram will not be accepted. No request from any bidder to the OPTCL to collect the Bids in physical form will be entertained by the OPTCL.

The OPTCL reserves the right to reject any bid, which is not deposited according to the instruction, stipulated above. The participants to the tender should be registered under GST Laws.

1. For all the users it is mandatory to procure the Digital Signatures of Class-III.
2. Contractors / Vendors / Bidders / Suppliers are requested to follow the below steps for Registration:

a. Click "Register", fill the online registration form.

b. Pay the amount of Rs. 2360/- through e-payment/DD in favour of K S E D C Ltd Payable at Bangalore.

c. Send the acknowledgment copy for verification.

d. As soon as the verification is being done the e-tender user id will be enabled.

3. After viewing Tender Notification, if bidder intends to participate in tender, he has to use his e-tendering User Id and Password which has been received after registration and acquisition of DSCs.
4. If any Bidder wants to participate in the tender he will have to follow the instructions given below:

a. Insert the PKI (which consist of your Digital Signature Certificate) in your System.

(Note: Make sure that necessary software of PKI be installed in your system).

b. Click / Double Click to open the Microsoft Internet Explorer (This icon will be located on the Desktop of the computer).

c. Go to Start > Programs > Internet Explorer.

d. Type **www.tenderwizard.com/OPTCL** in the address bar, to access the Login Screen.

e. Enter e-tender User Id and Password, click on "Go".

f. Click on "Click here to login" for selecting the Digital Signature Certificate.

g. Select the Certificate and enter DSC Password.

h. Re-enter the e-Procurement User Id Password

5. To make a request for Tender Document Bidders will have to follow below mentioned steps.

- Click “Un Applied” to view / apply for new tenders.
- Click on Request icon for online request.

6. After making the request Bidders will receive the Tender Documents which can be checked and downloaded by following the below steps:

- Click to view the tender documents which are received by the user.
- Tender document screen appears.
- Click “Click here to download” to download the documents.

7. After completing all the formalities Bidders will have to submit the tender and they must take care of following instructions.

- Prior to submission, verify whether all the required documents have been attached and uploaded to the particular tender or not.
- Note down / take a print of bid control number once it displayed on the screen

8. Tender Opening event can be viewed online.

9. Competitors bid sheets are available in the website for all.

10. **For any e-tendering assistant contact help desk number mentioned below.**

- Bangalore – 080- 40482000.

The participants to the tender should be registered under GST Laws.

**2. Division of Specification.**

The specification is mainly divided into two parts viz. Part-I & Part-II.

**Part-I Consists of**

| | |
|---|---|
| [i] Section-I | Instruction to Tenderers. |
| [ii] Section-II | General Terms & conditions of contract. |
| [iii] Section-III | Schedules and forms etc. |
| [iv] Section-IV | Technical Specification. |
| Vol-I | Technical Specification of RTU & LDMS |
| Vol-II | Technical Specification for power & Control cable. |
| [v] Section-V | Specification for Comprehensive AMC. |

**Part-II Consists of**

Schedule of prices as per Annexure-V

**3. Tenders shall be in Two Parts.**

The Tenderers are required to submit the tenders in two parts viz. Part-I ( Techno commercial) & Part-II (Price bid).

The Tenderers are required to submit the tenders in two parts Part-I, technical and commercial and Part-II "Price Bid".

**4. Opening of Bids.**

[a] The part-I shall be opened on the date and time fixed by the OPTCL for opening of bids in Electronic mode in presence of such of the Tenderers or their authorized representatives [limited to one person only] on the due date of opening of tender who opt remain present. After scrutiny of the technical particulars and other commercial terms, clarifications, if required, shall be sought for from the bidders. The Tenderers shall be allowed 15 days time for such activity.

[b] On receipt of technical clarification, the bids shall be reviewed, evaluated and those not in conformity with the technical Specification / qualifying experience, shall be rejected. If any of the technical proposal requires modification to make them comparable, discussion will be held with the participating bidders.

All the responsive bidders shall be given opportunity to submit the revised technical and revised price proposals as a follow up to the clarification (modification if any) on the technical proposals. The qualified bidders shall be given opportunity to submit revised price proposals within 15 days from the date of such discussion or within time frame mutually agreed, whichever is earlier.

[c] When the revised price proposals are received, the original price proposals will be returned to the bidders unopened along with their original technical proposals. Only the revised technical and price proposals will be considered for bid evaluation. The price bids [Part-II] of such of the Tenderers, whose tenders have been found to be technically and commercially acceptable, including those supplementary revised price bids, submitted subsequently, shall be opened in the presence of the bidder's representative on a date and time which will be intimated to all technically and commercially acceptable Tenderers.

[d] The bidders are required to furnish sufficient information to the Purchaser to establish their qualification, capacity to manufacture and/or supply the materials/perform the work. Such information shall include details of bidder's experience, its financial, managerial and technical capabilities.

[e] The bidders are also required to furnish details of availability of appropriate technical staff and capability to perform after sales services. The above information shall be considered during scrutiny and evaluation of bids and any bid which does not satisfactorily meet these requirements, shall not be considered for price bid evaluation.

[f] The price bids of the technically and otherwise acceptable bids shall only be evaluated as per the norms applicable in terms of this Specification.

**5. Purchaser's Right Regarding Alteration of Quantities Tendered.**

The Purchaser may alter the quantities of materials/equipment at the time of placing orders. Initially the purchaser may place orders for lesser quantity with full freedom to place extension orders for further quantity under similar terms and conditions of the original orders. Orders may also be split among more than one tenderer for any particular item, if considered necessary in the interest of the Purchaser to get the goods/equipment earlier.

**6. Procedure and opening time of tenders.**

Tenders will be opened in the office of the Senior General Manager [C.P.C.] on the specified date and time in presence of the Tenderers or their authorized representatives [limited to one person only] in case of each bidder who may desire to be present, at the time of opening the bids.

**7. Bidder's Liberty to deviate from Specification.**

The Tenderer may deviate from the specification while quoting, if in his opinion, such deviation is in line with the manufacturer's standard practice and conducive to a better and more economical offer. All such deviations should however be clearly indicated giving full justifications for such deviation. [Read with Clause-9, Section-II of the Specification].

**8. Eligibility for submission of bids.**

Only those manufacturers who have deposited the cost of tender specification are eligible to participate in the tender. They should submit the money receipt as a proof of such payment. The local Micro and small Enterprises (MSEs) **(In the state of Odisha)** based in Odisha and registered with respective DICs, Khadi, Village, Cottage & Handicrafts Industries, OSIC and NSIC can participate without payment of the cost of tender specification

**9. Purchaser's right to accept/reject bids:**

The purchaser reserves the right to reject any or all the tenders without assigning any reasons what so ever if it is in the interest of OPTCL, under the existing circumstances. [Read with clause-10, Section-II of the specification].

**10. Mode of submission of Tenders.**

[A] Tenders shall be submitted in electronic mode only. (www.tenderwizard.com/OPTCL)

[B] **Telegraphic or FAX tenders** shall not be accepted under any circumstances.

**11. Earnest money deposit:**

The tender shall be accompanied by Earnest Money deposit of value specified in the notice inviting tenders against each lot **/** bid. Tenders without the required EMD as indicated at **Annexure-VIII** will be rejected out rightly.

The local Micro and small Enterprises(MSEs) **(In the state of Odisha)** based in Odisha and registered with respective DICs, Khadi, Village, Cottage & Handicrafts Industries, OSIC and NSIC can participate by submitting Earnest Money Deposit @ fifty percent of the amount indicated in the Notice Inviting Tender.

The earnest money deposit shall be furnished in one of the following forms subject to the conditions mentioned below:

(a) **Cash:-**Payable to drawing & disbursing Officer, OPTCL (Hd.qrs. Office), Bhubaneswar - 751022

(b) **Bank Draft**: -To be drawn in favour of Drawing & Disbursing Officer, OPTCL [H.Qrs.Office], Bhubaneswar-751 022.

(c) Bank Guarantee from any Nationalized/Scheduled Bank strictly as per enclosed proforma vide **Annexure-VI** to be executed on non-judicial stamp paper worth Rs.29.00 or as applicable, as per prevailing laws in force and also to be accompanied by the confirmation letter of the issuing Bank Branch.

**NOTE:**

(i). The validity of the EMD in the form of Bank Guarantee shall be at least for 240 days from the date of opening of tender failing which the tender will be liable for rejection.

(ii) No interest shall be paid on the Earnest Money Deposit.

(iii) E.M.D. in shape of cash may be submitted up to Rs. 25,000/- (Rupees Twenty-five) Thousand) only. Above Rs. 25,000/- (Rupees Twenty-five thousand) the Earnest Money Deposit shall be furnished in any one of the forms indicated above (i.e. Through Bank Draft, Bank Guarantee/ National Savings Certificate).

(iv) No adjustment towards EMD shall be permitted against any outstanding amount with the **ODISHA POWER TRANSMISSION CORPORATION LTD**.

(v) The chart showing particulars of EMD to be furnished by Tenderers of different categories is placed at **Annexure-VIII.**

(vi) In the case of un- successful tenderer, the EMD will be refunded after the tender is decided. In the case of successful Tenderer, this will be refunded only after furnishing of security money referred to at clause-19of Section-II.

(vii) Suits, if any, arising out of this clause shall be filed in a Court of law to which the jurisdiction of High Court of ODISHA extends.

(vii) EMD will be forfeited if the tenderer fails to accept the letter of intent and/or purchase order issued in his favour or to execute the order, placed on them.

(viii) Tenders not accompanied by Earnest Money shall be disqualified.

**12. Validity of the Bids: -**

The tenders should be kept valid for a period of **180** days from the date of opening of the tender, failing which the tenders will be rejected.

**13. PRICE: -**

i)Tenderers are requested to quote-'FIRM' Price. No deviation from **FIRM PRICE** will be entertained irrespective of deviation clause No.7 of this part of the specification.

**14. Revision of tender price by Bidders**: -

[a] After opening of tenders and within the validity of period, no reduction or enhancement in price will be entertained. If there is any change in price, the tender shall stand rejected and the EMD deposited shall be forfeited.

**[b]** After opening of price bid if the validity period is not sufficient to place purchase order, the tenderer may be asked by the purchaser to extend the validity period of the bid under the same terms and condition as per the original tender.

However, the tender are free to change any or all conditions including price except delivery period of their bids at their own risk, if they are asked by the purchaser to extend the validity period of the bid prior to opening of price bid.

**15. Tenderers to be fully conversant with the clauses of the Specification:** -

Tenderers are expected to be fully conversant with the meaning of all the clauses of the specification before submitting their tenders. In case of doubt regarding the meaning of any clause, the tenderer may seek clarification in writing from the Senior General Manager (Central Procurement Cell) OPTCL. This, however, does not entitle the Tenderer to ask for time beyond due date, fixed for receipt of tender.

**16. Documents to Accompany Bids**.

Tenderers are required to submit tenders in the following manner:

**Part-I of the Tender shall Contain the following documents.**

[i] Declaration Form. [As per Annexure-I]

[ii] Earnest Money. [As per **Annexure-VIII**], Tender Cost.

[iii] Technical specification and Guaranteed Technical Particulars conforming to the Purchaser's Specification along with drawings, literatures and all other required Annexures, duly filled in.

[iv] Photostat copies of type test certificates of materials/equipment offered as stipulated in the Technical Specification.

[v] Abstract of Terms & conditions in prescribed proforma as per **Annexure-II.**

[vi] General Terms & Conditions of supply offer as per Section-II of the Specification.

[vii] List of orders executed for similar materials/equipment during preceding 3 (three) years indicating the customer's name, Purchase Order No. & Date, date of supply and date of commissioning etc.

[viii] Data on past experience **as per Clause-7 of Section-II** of the Specification.

[ix] GST Compliance Rating. The GST Identification Number(GSTIN) under GST Laws and permanent account number [PAN] of the firm under Income tax Act are required.

[x] Audited Balance sheet & profit loss accounts of the bidder, for past (3) three years.

[xi] Schedule of quantity and delivery in the prescribed Proforma vide Annexure, as appended.

[xii] List of Orders in hand to be executed.

[xiii] Deviation schedule.

(xiv) Local micro & small enterprisers (MSEs) **(In the state of Odisha)** based in Odisha and registered with respective DICs, Khadi, Village, Cottage & Handicrafts Industries, OSIC and NSIC have to submit notarized hard copy of valid registration as local MSE **(In the state of Odisha)** as above on or before the date & time of submission of techno-commercial bid and upload the scan/soft copy of the same in e-tender portal.

[xv] The bidder should not have any pending litigation or arbitration with OPTCL with regard to any project or related activity. The bidder should certify/declare the same in unequivocal terms by way of an affidavit duly sworn before a magistrate.

**17. Documents/Papers to accompany Part-II Bid.**

(a) Part – II of the tender shall consist of the following

(i) Schedule of prices in the prescribed proforma

**18. Conditional Offer:**

Conditional offer shall not be accepted.

**19. General: -**

(i) In the event of discrepancy or arithmetical error in the schedule of price, the decision of the purchaser shall be final and binding on the Tenderer.

(ii) For evaluation, the price mentioned in words shall be taken if there is any difference in figures and words in the price bid.

(iii) Notice inviting tender shall form part of this specification.

(iv) The price bids of the technically and otherwise acceptable bids shall only be evaluated. The EMD of others, if any, shall be returned to the bidders.

(v) Tenderer can offer any lot or all the lots of the tender, if there are more than one lots. But the tender (bid) must be furnished separately for each lot. For each lot, the tenderer has to submit PART-I & PART-II of the bids separately.

(vi) It should be distinctly understood that the part-II of the bid shall contain only details/documents relating to price, as outlined in clause-17 mentioned herein above. Inclusion of any of the documents/information etc. shall render the bid liable for rejection.

**20.0 Expenses in respect of OPTCL's representative for witnessing the inspection & testing of the offered equipment/materials at the inspection and testing site.**

The testing and inspection of the equipment/ materials at manufacturer works are in the scope of work of the Contractor/Supplier.

OPTCL inspecting officer, on receipt of offer for inspection from the contractor/supplier, proceeds to the manufacturer works to witness the Type/Acceptance/Routine test.

Important:

It is hereby informed to all the bidders that the relevant clauses of the contract specification, pertaining to inspection and testing of equipment/materials, are hereby supplemented with following additional terms and conditions.

The expenses under the following heads, in respect of OPTCL's representative for witnessing the inspection & testing of the offered equipment/materials at the inspection and testing site, shall be borne by the contractor / supplier.

**a) Hotel Accommodation:**

I. Single room accommodation in 4 star hotel for the OPTCL inspecting officer of the rank of Assistant General Manager (Grade E-6) and above.

II. Single room accommodation in 3 star hotel for the OPTCL inspecting officer of the rank below Assistant General Manager (Grade E-6).

N.B.: It is the responsibility of the contractor to arrange the hotel accommodation matching with their inspection and testing schedule, so that the inspecting officer can check-in the hotel one day prior to the date of inspection and check out after the completion of the inspection, subject to availability of the return travel ticket. In case of extended duration of inspection or non-availability of the return travel ticket, Contractor/supplier/manufacturer shall arrange for the extended stay of the inspecting officer in the Hotel accordingly. In case there is no hotel with prescribed standard in and around the place of inspection, the contractor/supplier/manufacturer shall suggest alternative suitable arrangement at the time of offer for inspection, which is subjected to acceptability of OPTCL inspecting officer.

**b) Journey of the inspecting officer:**

(i) To and fro travel expenditure from the Head Quarters of the inspecting officer to the place of inspection/testing shall be borne by the contractor/supplier/manufacturer. Journey from the Head Quarters of the inspecting officer to the nearest Air Port by train (Ist/IInd A.C) & A/C Taxi then by Air to the place of inspection/testing or to the nearest place of inspection/testing and then by train (Ist/IInd A.C) & A/C taxi to the place of inspection/testing shall be arranged by the contractor/supplier/manufacturer.

(ii) For train journey, inspecting officer of the rank Assistant General Manager and above shall be provided with 1st class AC ticket and inspecting officer below the rank of Assistant General Manager shall be provided with 2nd class AC ticket.

(iii) The Air-ticket / train-ticket booking/cancellation is the responsibility of the contractor / supplier.

(iv) Moreover, if during the journey there is an unavoidable necessity for intermediate travel by road/ waterway/sea-route, the contractor/supplier shall provide suitable conveyance to the inspecting officer for travel this stretch of journey or bear the cost towards this. Any such possibilities shall be duly intimated to OPTCL at the time of their offer for inspection.

**c) Local Conveyance:**

At the place of the inspection/testing, for local journey of the inspecting officer between Hotel and inspection/testing site and or any other places, Air-conditioned four wheeler vehicle in good condition shall be provided by the contractor/supplier/manufacturer.

**d) Following points are also to be considered:**

(i) All the above expenses shall be deemed to be included in the bidder's quoted price for that supply item. Bidder shall not be eligible to raise any extra claim in this regard.

(ii) Contractor/supplier/manufacturer may assume that only in 40% of the inspection and testing offer cases, OPTCL inspecting officer, not below the rank of Assistant General Manager will witness the inspection and testing.

(iii) In case of inspection and testing of some critical equipment/materials like Power transformers, OPTCL may depute more than one inspecting officer. (iv)Contractor/supplier/manufacturer shall judiciously plan the inspection/testing schedule and place of inspection/testing, so that optimum number of inspection/testing and minimum time shall be required to cover all the equipment/materials of the relevant contract package.

(v) It shall be the responsibility of the Contractor/Supplier to organize the above tour related matters of OPTCL inspecting officer including the matters related to overseas inspection/testing, if any.

21. **Litigation/Arbitration**

**(i)-** Bidder has to furnish detailed information on any litigation or arbitration arising out of contracts completed or under execution by it over the last five years. A consistent history of litigation by or against the bidder may result in rejection of bid.

**(ii)** The bidder should not have any pending litigation or arbitration with OPTCL with regard to any project or related activity. The bidder should certify/declare the same in unequivocal terms by way of an affidavit duly sworn before a magistrate or notary. Bid furnished by the bidder shall not be eligible for consideration if it is not accompanied by the affidavit. Further, the

bid/LOA/LOI shall liable for outright rejection/cancellation at any stage if any information contrary to the affidavit/declaration is detected.

**22. Pre-bid conference** : A pre-bid meeting shall be held on the scheduled date & time at the conference hall of the office of the Chief General Manager, CPC. OPTCL. Interested bidders may raise written queries **three days (03)** prior to the pre bid conference, if any, pertaining to this tender package, which shall be clarified during the pre-bid conference and to be uploaded in OPTCL website. **Queries after the dead line as indicated above shall not be entertained.**

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## SECTION – II.

## GENERAL TERMS AND CONDITIONS OF CONTRACT [G.T.C.C.]

PART-I

SECTION-II

**GENERAL TERMS AND CONDITIONS OF CONTRACT [G.T.C.C.]**

1. **Scope of the contract:**

1.1 The scope of the contract shall be the design, manufacture, assembly, inspection and testing at the manufacture's work, packing and delivery F.O.R. (destination) of the RTU (Configured with required MFT, CMR, OLTC transducer, etc. along with associated accessories as specified for the respective stations) and erection & commissioning of the RTU at the consignee's site and rendering services in accordance with the enclosed technical specification and bill of quantity (Appendix-II, Technical Specification).

1.2 The scope covers Supply & commissioning of LDMS with each of the RTU. The LDMS shall be supplied along with the required UPS as specified in the technical specification.

1.2 The scope also covers supply & laying of required interface cable/data cable for CT, PT, DI, Transducer and AC/DC Power supply for the erection & commissioning of the RTU. The said cables are to be supplied meeting to the specification mentioned in the vol-II of the technical specification. The tentative requirement of such cables has been specified in the BOQ in Appendix-IA & IB of the technical specification.

1.3 The contractor has to carry out survey for the exact requirement of such cables at all the sites and submit the survey report jointly signed by the respective site in-charge to the employer for approval and for subsequent amendment to the work order if there is a change in the BOQ in respect of cables and accessories. The contractor shall survey the proposed RTU stations prior to bidding at their own cost.

1.4 Such supply & commissioning of RTU shall be made against replacement of existing RTU (model: S-900) of the then M/s Areva make and against some new stations. These old RTUs to be replaced are presently operational at the stations detailed at Appendix-II (A,B&C) of technical specification, section-IV. Hence utmost care should be taken to optimize the minimum data interruption.

1.5 The contractor has to dispatch the RTU and the required MFT, CMR, OLTC transducer, etc along with the required interface cable/data cable for CT, PT, DI, Transducer and AC/DC Power supply to the designated site.

1.6 The RTU at the respective stations shall be installed and commissioned along with all the cabling work for the connection and shall be tested locally. The integration of the RTU with the central SCADA are not within the scope of this contract. However the contractor shall extend full cooperation at the scheduled time of such integration with the SCADA OEM.

The scope of the work further includes comprehensive annual maintenance contract of the configured RTU so commissioned for a period of 5(Five years) as per the specification at section-V of the tender specification.

2.0 **Definition of terms:**

For the purpose of this specification and General Terms and Conditions of contract [GTCC], the following words shall have the meanings hereby indicated, except where otherwise described or defined.

2.1 "The Purchaser" shall mean the Senior General Manager[Central Procurement Cell] for and on behalf of ODISHA POWER TRANSMISSION CORPORATION LTD., Bhubaneswar.

2.2 "The Engineer" shall mean the Engineer appointed by the Purchaser for the purpose of this contract.

2.3 "Purchaser's Representative" shall mean any person or persons or consulting firm appointed and remunerated by the Purchaser to supervise, inspect, test and examine workmanship and materials of the equipment to be supplied.

2.4 "The supplier" shall mean the bidder whose bid has been accepted by the purchaser and shall include the bidder's executives, administrators, successors and permitted assignees.

2.5 "Equipment" shall mean and include all machinery, apparatus, materials, and articles to be provided under the contract by the suppliers.

2.6 "Contract Price" shall mean the sum named in or calculated the bid.

2.7 "General Condition" shall mean these General Terms and Conditions of Contract.

2.8 The Specification" shall mean both the technical as well as commercial parts of the specification annexed to or issued with GTCC and shall include the schedules and drawings, attached thereto as well as all samples and pattern, if any.

2.9 "Month" shall mean "Calendar month".

2.10 Writing" shall include any manuscript, type written, printed or other statement reproduction in any visible form and whether under seal or under hand.

2.11 Basic Price (Taxable value for Goods) at the point of destination" shall mean the price quoted by the bidder for equipment and material at the consignee's store/site. The cost is inclusive of packing, forwarding, freight, insurance and all expenses and taxes & duties at the end of the supplier excluding Goods & Service Tax. The Goods & Service Tax shall be shown in a separate column item

wise alongside the Basic Price quoted at the applicable rate in the Tax Invoice. The applicable rate of GST shall refer to the HSN code of the material supplied. The Basic Price and GST thereon shall be the "FOR Destination Price" as quoted by the bidder.

2.12 The term "Contract document" shall mean and include GTCC, specifications, schedules, drawings, form of tender, Notice Inviting Tender, covering letter, schedule of prices or the final General Conditions, any special conditions, applicable to the particular contract.

2.13 Terms and conditions not herein defined shall have the same meaning as are assigned to them in the Indian Contract Act, failing that in the Odisha General Clauses Act.

3. **Manner of execution**:

All equipment supplied under the contract shall be manufactured in the manner, set out in the specification or where not set out, to the reasonable satisfaction of the Purchaser's representative.

4. **Inspection and Testing**:

[i] The purchaser's representative shall be entitled at all reasonable times during manufacture to inspect, examine and test at the supplier's premises, the materials and workmanship of all equipment/materials to be supplied under this contract and if part of the said equipment/material is being manufactured in other premises, the supplier shall obtain for the purchaser's representative permission to inspect, examine and test as if the equipment/material were being manufactured in the contractor's premises. Such inspection, examination and testing shall not relieve the supplier from his obligations under the contract.

[ii] The Supplier shall give to the purchaser adequate time/notice (at least clear 15 days for inside the state suppliers and 20 days for outside the state suppliers) in writing for inspection of materials indicating the place at which the equipment/material is ready for testing and inspection and shall also furnish the shop Routine Test Certificate, Calibration certificates of Testing instruments, calibrated in Govt. approved laboratory with authenticity letter of that laboratory along with the offer for inspection. A packing list along with the offer, indicating the quantity which can be delivered in full truck load/Mini truck load to facilitate issue of dispatch instruction shall also be furnished.

[iii] Where the contract provides for test at the Premises of the supplier or any of his sub-vendors, the supplier shall provide such assistance, labour, materials, electricity, fuel and instruments, as may be required or as may be reasonably demanded by the Purchaser's representative to carry out such tests efficiently. The supplier is required to produce shop routine test Certificate, calibration certificates of Testing Instruments before offering their materials/equipment for inspection & testing. The test house/laboratory where tests are to be carried out must be approved by the Govt. A letter pertaining to Govt. approved laboratory must be furnished to the purchaser along with the offer for inspection.

[iv] After completion of the tests, the Purchaser's representative shall forward the test results to the Purchaser. If the test results conform to the specific standard and specification, the Purchaser shall approve the test results and communicate the same to the supplier in writing. The supplier shall provide at least five copies of the test certificates to the Purchaser.

[v] The Purchaser has the right to have the tests carried out at his own cost by an independent agency whenever there is dispute regarding the quality of supply.

[vi] If the firm fails to present the offered items for inspection/testing as per their inspection call due to any reason(s) during the visit of inspecting officer at the testing site ,the firm shall have to bear all expenses towards repetition of inspection and testing of the total offered quantity or part thereof.

5. **Training facilities.**

The supplier shall provide all possible facilities for training of Purchaser's Technical personnel, when deputed by the Purchaser for acquiring first-hand knowledge in assembly , erection, commissioning and for its proper operation & maintenance in service.

6. **Rejection of Materials.**

In the event any of the equipment /material supplied by the manufacturer is found defective due to faulty design, bad workmanship, bad materials used or otherwise not in conformity with the requirements of the Specification, the Purchaser shall either reject the equipment/material or ask the supplier in writing to rectify or replace the defective equipment/material free of cost to the purchaser. The Supplier on receipt of such notification shall either rectify or replace the defective equipment/material free of cost to the purchaser within 15 days from the date of issue of such notification by the purchaser. If the supplier fails to do so, the Purchaser may:-

[a] At its option replace or rectify such defective equipment /materials and recover the extra costs so involved from the supplier plus fifteen percent and/or.

[b] Terminate the contract for balance work/supplies, with enforcement of penalty Clause as per contract for the un-delivered goods and with forfeiture of Performance Guarantee/ Composite Bank guarantee.

[c] Acquire the defective equipment/materials at reduced price, considered equitable under the circumstances.

**7. Experience of Bidders**:

The bidders should furnish information regarding experience particularly on the following points:

[i] Name of the manufacturer:

[ii] Standing of the firm and experience in manufacture of equipment/material quoted:

[iii] Description of equipment/material similar to that quoted, supplied and installed during the last two years with the name(s) of the Organizations to whom supplies were made wherein, at least one (1) certificate shall be from a state/central P.S.U.

[iv] Details as to where installed etc.

[v] Testing facilities at manufacturer's works.

[vi] If the manufacturer is having collaboration with another firm [s], details regarding the same.

[vii] A list of purchase orders of identical material/equipment offered as per technical specification executed during the last two years along with users certificate. User's certificate shall be legible and must indicate, user's name, address, designation, place of use, and satisfactory performance of the equipment/materials for at least two years from the date of commissioning. Wherein at least one (1) certificate shall be from a State/Central or P.S.U.Bids will not be considered if the past manufacturing experience is found to be un-satisfactory or is of less than 2 (two) years on the date of opening of the bid and bids not accompanying user's certificate will be rejected..

8. **Language and measures**:

All documents pertaining to the contract including specifications, schedule, notices, correspondence, operating and maintenance instructions, drawings or any other writing shall be written in English language. The metric system of measurement shall be used exclusively in this contract.

9. **Deviation from specification**:

It is in the interest of the tenderers to study the specification, specified in the tender schedule thoroughly before tendering so that, if any deviations are made by the Tenderers,(both commercial and Technical), the same are prominently brought out on a separate sheet under heading "Deviations Commercial" and " Deviations Technical".

A list of deviations shall be enclosed with the tender. Unless deviations in scope, technical and commercial stipulations are specifically mentioned in the list of deviations, it shall be presumed that the tenderer has accepted all the conditions, stipulated in the tender specification, not- withstanding any exemptions mentioned therein.

10. **Right to reject/accept any tender**:

The purchaser reserves the right either to reject or to accept any or all tenders if the situation so warrants in the interest of the purchaser. Orders may also be split up between different Tenderers on individual merits of the Tenderer. The purchaser has exclusive right to alter the quantities of materials/ equipment at the time of placing final purchase order. After placing of the order, the purchaser may defer the delivery of the materials. It may be clearly understood by the Tenderer that the purchaser need not assign any reason for any of the above action [s].

11. **Supplier to inform himself fully**:

The supplier shall examine the instructions to tenderers, general conditions of contract, specification and the schedules of quantity and delivery to satisfy himself as to all terms and conditions and circumstances affecting the contract price. He shall quote price [s] according to his own views on these matters and understand that no additional allowances except as otherwise provided there in will be admissible. The purchaser shall not be responsible for any misunderstanding or incorrect information, obtained by the supplier other than the information given to the supplier in writing by the purchaser.

12. **Patent rights Etc.**

The supplier shall indemnify the Purchaser against all claims, actions, suits and proceedings for the infringement of any patent design or copy right protected either in the country of origin or in India by the use of any equipment supplied by the manufacturer. Such indemnity shall also cover any use of the equipment, other than for the purpose indicated by or reasonably to be inferred from the specification.

13. **Delivery:-**

[a] Time being the essence of the contract; the equipment shall be supplied within the delivery period, specified in the contract. The Purchaser, however, reserves the right to reschedule the delivery and change the destination if required. The delivery period shall be reckoned from the date of placing the Letter of Intent/Purchase order, as may be specified in LOI/Purchase order.

[b] The desired delivery period shall be as indicated at Appendix-II (Quantity & Delivery Schedule) of Section-IV (Technical Specification).

[c] *Installation & Commissioning :* The desired schedule for installation & commissioning shall be as indicated at Appendix-II, section-IV (Technical specification)

14. **Despatch instructions**.

I] The equipment / materials should be securely packed and dispatched directly to the specified site at the supplier's risk by Road Transport only.

II] **Loading & unloading of Ordered Materials.**

It will be the sole responsibility of the supplier for loading and unloading of materials both at the factory site and at the destination site/store.

The Purchaser shall have no responsibility on this account.

15. **Supplier's Default Liability.**

[i] The Purchaser may, upon written notice of default to the supplier, terminate the contract in circumstances detailed hereunder.

[a] If in the judgment of the Purchaser, the supplier fails to make delivery of equipment/material within the time specified in the contract or within the period for which if extension has been granted by the Purchaser in writing in response to written request of the supplier.

[b] If in the judgment of the Purchaser, the supplier fails to comply with any of the provisions of this contract.

[ii] In the event, Purchaser terminates the contract in whole or in part as provided in Clause-15 {I) of this section, the Purchaser reserves the right to purchase upon such terms and in such a manner as he may deem appropriate in relation to the equipment/material similar to that terminated and the supplier will be liable to the Purchaser for any additional costs for such similar equipment/material and/or for penalty for delay as defined in clause-22 of this section until such reasonable time as may be required for the final supply of equipment.

[iii] In the event the Purchaser does not terminate the contract as provided in clause 15(I) of this Section, supplier shall be liable to the Purchaser for penalty for delay as set out in Clause-22 of this section until the equipment is accepted. This shall be based only on written request of the supplier and written willingness of the Purchaser.

16 **Force Majeure**:

The supplier shall not be liable for any penalty for delay or for failure to perform the contract for reasons of force majeure such as acts of god, acts of the public enemy, acts of Govt., Fires, floods, epidemics, Quarantine restrictions, strikes, Freight Embargo and provided that the supplier shall within Ten (10)days from the beginning of delay on such account notify the purchaser in writing of the cause of delay. The purchaser shall verify the facts and grant such extension, if facts justify .

**17. Extension of time**:-

If the delivery of equipment/material is delayed due to reasons beyond the control of the supplier, the supplier shall without delay give notice to the purchaser in writing of his claim

for an extension of time. The purchaser on receipt of such notice may or may not agree to extend the contract delivery date as may be reasonable but without prejudice to other terms and conditions of the contract.

18. **Guarantee period:**

[i] **[i]** The stores covered by this specification should be guaranteed for satisfactory operation and against defects in design, materials and workmanship for a period of at least 36 [thirty six] months from the date of commissioning. The above guarantee certificate shall be furnished in triplicate to the purchaser for his approval. Any defect noticed during this period should be rectified by the supplier free of cost to the purchaser provided such defects are due to faulty design, bad workmanship or bad materials used, within one month upon written notice from the purchaser failing which provision of clause 22 (ii) shall apply.

[ii] Equipment/material failed or found defective during the guarantee period shall have to be guaranteed after repair/replacement for a further period of 36 months from the date of commissioning after such repair/replacement. The Bank Guarantee is to be extended accordingly. Date of delivery as used in this clause shall mean the date on which the

materials are received in OPTCL'S stores/site in full & good condition which are released for Despatch by the purchaser after due inspection.

**19. B.G. towards security deposit, 100% payment and performance guarantee:**

[i] For manufacturers situated Inside & out side the state of Odisha.

A Composite Bank Guarantee as per the Proforma enclosed at Annexure-VII of the specification for 10% [ten percent] of the Total Landing cost (Taxable Value plus GST thereon) of the purchase order(In case of successful bidder who is a local Micro and small Enterprise(MSEs) registered with respective DICs, Khadi, Village, Cottage & Handicrafts Industries, OSIC and NSIC 5% (five percent)), shall be furnished from any nationalized/scheduled bank having a place of business at Bhubaneswar, to the office of Sr.General Manager [Central Procurement Cell] OPTCL within 15 days from the date of issue of the purchase order,. The BG shall be executed on non judicial stamp paper worth of Rs.29.00 [Rupees twenty nine] only or as per the prevalent rules, valid for a period of 38 months from the last date of stipulated delivery and commissioning period, for scrutiny and acceptance, failing which the supply order will be liable for cancellation without any further written notices. The BG should be accompanied by a confirmation letter from the concerned bank and should have provision for encashment at Bhubaneswar, before the Bank Guarantee is accepted and all concerned intimated. The B.G should be revalidated as and when intimated to you to cover the entire guarantee period.

[ii] No interest is payable on any kind of Bank Guarantee.

[iii] In case of non-fulfillment of contractual obligation, as required in the detailed purchase order/Specification, the composite Bank guarantee shall be forfeited.

[iv] **BG FOR AMC FOR RTU:** Performance BG against AMC shall be furnished by the contractor as per the clause-III, Section-V (specification for comprehensive AMC of the RTU).

**20. Import License**

In case imported materials are offered, no assistance will be given for release of Foreign Exchange. The firm should arrange to import materials from their own quota. Equipment of indigenous origin will be preferred.

**21. (A) Terms of Payment.**

**21. Terms of Payment.**

i) 90% taxable value of each consignment with 100% Goods and Services Tax in full as applicable will be paid on receipt of materials in good condition at stores/desired site and verification thereof, subject to furnishing and approval of a. Contract cum Performance Bank Guarantee at the rate of 10% (Ten percent) of Taxable Value plus GST thereon [In case successful bidder is a local Micro and small Enterprise (MSEs), based in Odisha & registered with respective DICs, Khadi, Village, Cottage & Handicrafts Industries, OSIC and NSIC, 5% (five percent) in place of 10% (ten percent) will be applicable].

b.Guarantee certificate, c.Test certificate by the Purchaser.

ii) TDS under GST Laws for intra state transactions shall be deducted as applicable.

iii)Any imposition of new tax or revision of tax shall be paid/reimbursed at the time of dispatch, scheduled or actual whichever is lower (i.e. If delivery is within schedule period, tax variation as applicable shall be paid, and if delivery is made beyond schedule date, any additional financial implication due to statutory variation in tax shall be to bidder's account)

Balance 10% of the taxable value of the equipment along with commissioning charges, if any, shall be paid after successful erection & commissioning of equipment at the required site, on issuance of taking over certificate by the concerned site-in-charge or within 1(one) year from the date of delivery whichever is earlier.

**[C] Terms of payment for AMC for RTU**: The terms of payment for AMC shall be as per clause-II, Section-V (Specification for comprehensive AMC of RTU).

**22. Price Reduction Schedule**:

Price Reduction Schedule for Delay in Completion of Supply/commissioning under Purchase Order/Contract

(i) If the Supplier fails to deliver the materials/equipment or complete commissioning within the delivery schedule, specified in the Purchase Order/Contract including delivery time extension, if any, granted with waiver of Price Reduction Schedule, the Purchaser shall recover from the Supplier, Price Reduction Schedule for a sum of half per cent (0.5 per cent) of the Taxable Value of the un-delivered equipment /materials/uncompleted portion for each calendar week of delay or part thereof. For this purpose, the date of receipted challan shall be reckoned as the date of delivery. The total amount of Price Reduction Schedule shall not exceed five per cent (5%) of the Taxable Value of the un-delivered equipment/materials/erection. Equipment will be deemed to have been delivered only when all its components, accessories and spares as per technical Specification are also delivered. If certain components, accessories and spares are not delivered in time, the equipment/materials will be considered delayed until such time as the missing components, accessories and spares are delivered.

(ii) During the guarantee period, if the Supplier fails to rectify/replace the equipment/material/installation within 30 days from the date of intimation of defect by the purchaser, then the Price Reduction Schedule at the rate of half percent (0.5%) of the Total Taxable Value for each calendar week of delay or part thereof shall be recovered by the purchaser. For this purpose, Price Reduction Schedule shall be reckoned from the 30th day from the date of issue of letter on defectiveness of equipment/material/installation. The total amount of Price Reduction Schedule in this case shall not exceed 10% (TEN PERCENT) of the Purchase Order/Contract amount except GST (i.e.Total Taxable Value). If the defects, so intimated are not rectified or equipment/materials not replaced by the supplier within the guarantee period, then whole of the C.P.B.G. will be forfeited by the purchaser, without any intimation to the supplier.

(iii) **Price reduction Schedule for AMC for RTU**: As per clause-IV, Section-V (Specification for comprehensive AMC of RTU)

23. **Insurance**

The Supplier shall undertake insurance of stores covered by this Specification unless otherwise stated. The responsibility of delivery of the stores at destination in good condition rests with the Supplier. Any claim with the Insurance Company or transport agency arising due to loss or damage in transit has to be settled by the supplier. The Supplier shall undertake free replacement of materials damaged or lost, which will be reported by the consignee within 30 days of receipt of the materials at destination without awaiting for the settlement of their claims with the carriers and underwriters.

**24. Payment Due from the Supplier**. All costs and damages, for which the supplier is liable to the purchaser, will be deducted by the purchaser from any money, due to the supplier, under any of the contract (s), executed with OPTCL.

**25. Rating under Goods and Services Tax and Balance sheet and profit & Loss Account:**

The following documents are to be submitted at the time of Tender Submission:

i. Compliance rating under Goods and Services Tax for immediate preceding financial year.
ii. Audited Balance Sheet and Profit & Loss Account of the bidder for the previous three years to assess the financial soundness of the bidder(s).
iii. GST registration certificate and PAN Card Copy.

iv. Tax holiday/exemption certificate under GST or any other Act.

v. TDS exemption certificate under the Income Tax Act or any other act.

**26. Certificate of Exemption from Goods and Services Tax**.

Offers with exemption from Goods and Services Tax shall be accompanied with authenticated attested Photostat copy of exemption certificate. Any claim towards Goods and Services Tax shall be paid on actual basis subject to payment of GST by the supplier. In case Outward supply details of the supplier of Goods in GSTR-1 do not match with GSTR -2 of OPTCL on GSTN portal, the same will be adjusted through debit/credit advice issued by OPTCL under intimation to the supplier after allowing cooling period of 3 months after the date of supply.

**27. Supplier's Responsibility**.

Notwithstanding anything mentioned in the Specification or subsequent approval or acceptance by the Purchaser, the ultimate responsibility for design, manufacture, materials used and satisfactory performance shall rest with the Tenderers. The Supplier(s) shall be responsible for any discrepancy noticed in the documents, submitted by them along with the bid(s)

**28. Validity.**

Prices and conditions contained in the offer should be kept valid for a minimum period of **180** days from the date of opening of the tender, failing which the tender shall be rejected.

**29. EVALUATION.**

**(i)** Evaluation of bids will be on the basis of the FOR DESTINATION PRICE (By Road Transport) including Goods and Services Tax & other levies as may be applicable. The FORD PRICE shall consist of the following components

a) Taxable value of equipment/materials

b) Goods and Services Tax

c) Other levies.

d) Mandatory spares, if any for maintenance of equipment. (At the discretion of the purchaser)

e) Test charges, if any.

f) Erection, testing and commissioning charges, if any.

g) Comprehensive AMC charges.

h) Any other items, as deemed proper for evaluation by the purchaser.

i) Loading factors will be taken in to account during evaluation if the prices of some of the items, not quoted.

j) Any imposition of new tax or revision of tax shall be considered at the time of price bid evaluation.

**(II) Weightage shall be given to the Following factors in the Evaluation & Comparison of Bids.**

In comparing bids and in making awards, the Purchaser will consider other factors such as compliance with Specification, minimum qualification criteria as per clause-30, outright rejection of tenders clause-34 of this tender, relative quality, adaptability of Supplies or services, experience, financial soundness, record of integrity in dealings, performance of materials/equipment earlier supplied, ability to furnish repairs and maintenance services, the time of delivery, capability to perform including available facilities such as adequate shops, plants, equipment and technical organization.

(III) The local MSE **(In the state of Odisha)** bidders, based in Odisha, shall be required to furnish their willingness to match their bid price with that of the lowest evaluated bidder without any price preference and in case they agree, they shall be eligible to get up to **30%** of the tendered quantity to be distributed suitably among the willing MSE bidders failing which the said **30%** of the tendered quantity be awarded to the lowest evaluated bidder.

**30. Minimum Qualification Criteria of Bidders**.

All the prospective bidders are requested to note that their bids for tendered equipment can only be considered for evaluation if:

i) The bidder should have manufacture and supply experience of above rated or higher capacity equipment for a minimum period of 2 (two) years as on the date of opening of the tender.

ii) At least 50% of the tendered quantity of above rated or higher capacity equipment should have been supplied and commissioned in an EHV environment of 132 kV or above sub-station/power plant within the above-stipulated period in India.

iii) The above rated or higher capacity equipment should have at least 2 (two) years successful performance from the date of commissioning. At least one of the performance certificates shall be submitted from Govt. of India/State Govt.(s) or their undertakings.

iv) The bidder should have conducted type tests on the tendered equipment from NABL/ internationally accredited laboratory within last five years from the date of opening of the techno-commercial bid.

**31. Jurisdiction of the High Court of Odisha.**

`Suits, if any, arising out of this contract shall be filed by either Party in a court of Law to which the jurisdiction of High court of Odisha extends.

**32. Correspondences.**

i) Any notice to the supplier under the terms of the contract shall be served by Registered Post or by hand at the Supplier's Principal Place of Business.

ii) Any notice to the Purchaser shall be served at the Purchaser's Principal Office in the same manner.

33. **Official Address of the Parties to the Contract**

The address of the parties to the contract shall be specified:-

[i] **Purchaser**: Senior General Manager (Procurement)(CPC) OPTCL
Bhubaneswar-751022 (Odisha)
Telephone No. 0674 - 2541801
FAX No. 0674 - 2542964

[ii] **Supplier:** Address
Telephone No.
Fax No.

34. **Outright Rejection of Tenders**

Tenders shall be outrightly rejected if the followings are not complied with.

[i] The tenderer shall submit the bid in electronic mode only and shall submit the tender cost on or before the date and time of submission of technical bid. . In case of local Micro

and small Enterprises(MSEs) **(In the state of Odisha)**, based in Odisha & registered with respective DICs, Khadi, Village, Cottage & Handicrafts Industries, OSIC and NSIC participating in the tender they have to submit notarised hard copy of valid registration as local MSE as above on or before the date and time of submission of technical bid.

[ii] The tenderer shall submit the bid in electronic mode only

[iii] The Tender shall not be submitted telegraphically or by FAX.

[iv] The prescribed EMD shall be submitted on or before the date and time of submission of technical bid.

[v] The Tender shall be kept valid for a minimum period of 180 days from the date of opening of tender.

[vi] The Tender shall be submitted in two parts as specified.

[vii] The Tenders shall be accompanied by a list of major supplies made prior to the date of opening of tender. Data of at least 2 (two) years shall be furnished.

[viii] The tenderer shall upload the scanned copy of latest type test certificates (for the tests, carried out on the tendered equipment, being offered). Such type tests should have been conducted within last five years from the date of opening of this tender in a Government approved laboratory/CPRI in presence of any Government Organization's representative(s).

[ix] The schedule of prices should be filled up fully to indicate the break-up of the prices including taxes and duties. Incomplete submission of this schedule will make the tender liable for rejection. Vide Clause-4(ii) of Part-II..

[x] The Tenderer should quote 'FIRM' price only and the price should be kept valid for a minimum period of 180 days from the date of opening of the tender.

(xi) The tenderer shall upload the scanned copy legibly written user's certificate to prove the satisfactory operation of the offered equipment /materials for a minimum period of 2 years from the date of commissioning/use as per the tender specification. User's certificate shall include the detailed address of the user with Equipment/Material, Name and type as per this specification, number of years of satisfactory use/operation & date of issue of this user's certificate with official seal written in English only & clearly visible must be furnished. At least one of the user's certificates shall be from state or Central Govt. or their Undertakings.

(xii) Guaranteed Technical particulars & Abstract of terms and Conditions should be filled in completely.

(xiii) (a) Detailed information on any litigation or arbitration arising out of contract completed or under execution by it over the last five years. A consistent history of litigation by or against the bidder may result in rejection of bid.

(xiii) (b) The bidder should not have any pending litigation or arbitration with OPTCL with regard to any project or related activity. The bidder should certify / declare the same in the

unequivocal terms by way of an affidavit duly sworn before a magistrate. Bid furnished by the bidder shall not be eligible for consideration if it is not accompanied by the affidavit. Further the bid / LOA/ LOI shall be liable for outright rejection/ cancellation at any stage if any information contrary to the affidavit / declaration is detected.

35. **Documents to be treated as confidential**.

The supplier shall treat the details of the specification and other tender documents as private and confidential and these shall not be reproduced without written authorization from the Purchaser.

36. **Scheme/Projects**

The materials/equipment covered in this specification shall come under "CAPITAL WORKS "

SECTION – III.

*LIST OF ANNEXURES*

**[I TO XI]**

**[PAGE 33 TO 51 ]**

**SECTION – III**

**[LIST OF ANNEXURES]**

The following schedules and proforma are annexed to this specification and contained in Section-III as referred to in the relevant clauses.

| | | |
|---|---|---|
| 1 | Declaration form | ANNEXURE-I |
| 2 | Abstract of terms and conditions to accompany Section-II of Part-I | ANNEXURE-II |
| 3 | Schedule of Quantity and Delivery | ANNEXURE-III |
| 4 | Abstract of price component [to accompany Part-II of this specification] | ANNEXURE-IV |
| 5 | Schedule of prices to accompany Part-II | ANNEXURE-V |
| 6 | Bank Guarantee form for earnest money deposit | ANNEXURE-VI |
| 7 | Composite Bank Guarantee form for security deposit, payment and performance | ANNEXURE-VII |
| 8. | Chart showing particulars of E.M.D. | ANNEXURE – VIII |
| 9. | Data on Experience. | ANNEXURE – IX |
| 10. | Schedule of spare parts. | ANNEXURE-X |
| 11. | Schedule of Installations. | ANNEXURE-XI |
| 12 | Schedule of deviations ( Technical) | ANNEXURE-XII (A) |
| 13. | Schedule of deviations (Commercial) | ANNEXURE-XII (B) |
| 14 | Litigation /Arbitration | ANNEXURE-XIII |

**ANNEXURE - I**
**DECLARATION FORM**

To

The Chief General Manager (CPC)
OPTCL Head Qrs.BBSR,751022

Sub:- Tender Specification No-_____

Sir,

1. Having examined the above specification together with terms & conditions referred to therein * I/We the undersigned hereby offer to supply the materials/equipment covered therein complete in all respects as per the specification and General conditions, at the rates, entered in the attached contract schedule of prices in the Tender.

2. * I/We hereby undertake to have the materials/equipment delivered within the time specified in the Tender.
3. * I/We hereby guarantee the technical particulars given in the Tender supported with necessary reports from concerned authorities.

4. * I/We certify to have submitted the bid electronically by remitting *cash/money order/D.D./ remitting the cost of tender, herewith and this has been acknowledged by your letter/ money receipt No. Dated,

5. In the event of Tender, being decided in *my/our favour, * I/We agree to furnish the Composite B.G. in the manner, acceptable to ODISHA POWER TRANSMISSION CORPORATION LTD., and for the sum as applicable to *me/us as per clause-19 of section-II of this specification within 15 days of issue of letter of intent/purchase order failing which *I/We clearly understand that the said letter of Intent/Purchase order will be liable to be withdrawn by the purchaser, and the EMD deposited by us shall be forfeited by OPTCL.

Signed this day of 2016

Yours faithfully

Signature of the Tenderer with seal of the company

[This form should be dully filled up by the tenderer and uploaded at the time of submission of tender.]

* (Strikeout whichever is not applicable).

**ANNEXURE-II**

ABSTRACT OF GENERAL TERMS AND CONDITIONS OF CONTRACT [COMMERCIAL] TO ACCOMPANY PART-I

**(**To be filled up by the tenderer as indicated in the excel sheet for "Abstract of price component & other commercial terms"**)**

**ANNEXURE-III**

**SCHEDULE OF QUANTITY AND DELIVERY ALONG WITH INSTALLATION & COMMISSIONING**

**(**To be filled up by the tenderer**)**

| Sl No | Description | UOM | Quantity required | Desired Delivery | Desired installation & commissioning | Destination | Remarks |
|---|---|---|---|---|---|---|---|
| **1** | RTU (Type-I) | Set | 60 | 6months from the date of LOA | 3 months from the scheduled delivery period | Any store/site of OPTCL | |
| **2** | RTU (Type-II) | Set | 18 | | | -do- | |
| **3** | Multi Function Meter | Nos | 1697 | | | -do- | |
| **4** | Contact Multiplying Relay | Nos | 7177 | | | -do- | |
| **5** | OLTC Tranducers | Nos | 241 | | | -do- | |
| **6** | Weather Sensor | Nos | 78 | | | -do- | |
| **7** | 2.5 sq mm single core flexible cable for PT | Kms | 38.550 | | | -do- | |
| **8** | 4 sq mm single core flexible cable for CT | Kms | 62.824 | | | -do- | |
| **9** | 1.5 sq mm 10 core control cable for digital input | Kms | 82.488 | | | -do- | |
| **10** | 2 pair 0.5 sq mm screened date cable (1.5 sq mm) for MFM output. | Kms | 15.402 | | | -do- | |
| **11** | 2.5 sq mm 3 core control cable for AC supply. | Kms | 6.700 | | | -do- | |
| **12** | 2.5 sq mm 2 core control cable for DC supply. | Kms | 10.869 | | | -do- | |
| **13** | 1.5 sq mm 4 core control cable for OLTC input. | Kms | 7.463 | | | -do- | |

Signature of Tenderer

with seal of Company

***ANNEXURE-IV***

(To be filled up by the tenderer as indicated in the excel sheet)

NB:- Abstract of price component shall be done for equipment/material offered, for installation, testing & commissioning and AMC charges, if any. All the above prices will be taken during bid price evaluation.

***ANNEXURE-V.***

**SCHEDULE OF PRICES** **TENDER SPECIFICATION No.**

| Item No. | Description. | Qty (unit) | Unit<br>Taxable Value at destination store/ site including transformer oil & other accessories & testing as per spec. |
|---|---|---|---|
| 1. | 2. | 3. | 4. |

| Unit GST | Unit landing Cost including All taxes & Duties. | Total landing cost Including all taxes & duties. |
|---|---|---|
| 5. | 6= (4+5) | 7= (6*3) |

| Erection Cost in INR (Rs) | | | Grand Total |
|---|---|---|---|
| Unit Erection cost | Unit GST | Total erection cost | 7+10 |
| 8 | 9 | 10 | 11 |

| | | Comprehensive AMC cost (Rs) | | | | | Grand Total |
|---|---|---|---|---|---|---|---|
| Unit AMC for 1st year | Unit AMC for 2nd year | Unit AMC for 3rd year | Unit AMC for 4th year | Unit AMC for 5th year | Total AMC for 5 yrs | Total GST | 11 + 18 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |

Signature of Tenderer

Name, Designation and Seal

NB: -

1. The tenderer should fill up the price schedule properly in excel file in e-tender mode. The tender will be rejected, if the price bid is not submitted in accordance with the price schedule. No post tender correspondence will be entertained on break-up of prices. Also, the supplier should agree for delivery at the desired site.

2. The Tenderer shall give an undertaking in part-I of the bid that, entire implication of lower tax and input tax credit benefit have been fully passed on to the purchaser as per anti-profiteering and other provisions under GST Laws while quoting the tender price.

3. Conditional offers will not be acceptable.

4. The bidder is to clearly indicate the period up to which the tax holidays are available to them.
5. Price bid in any other format will not be acceptable and the offer will be rejected.
6. All the above charges will be taken into account, during bid price evaluation.

**ANNEXURE-VI**

## [PROFORMA FOR BANK GUARANTEE FORM FOR EARNEST MONEY DEPOSIT]

**(To be Stamped in accordance with Stamp Act and the Non-Judicial Stamp Paper of appropriate value should be in the name of Issuing Bank)**

**Ref No: …….**

**Bank Guarantee No. …….**

**Date:……**
**BG Amount:…….**
**Validity Period:……..**

This Guarantee Bond is executed this…… day of …… by us the…… Bank at …… , P.O…… , Dist……, State…… and Code No……..

Whereas the ODISHA POWER TRANSMISSION CORPORATION Limited, Janpath, Bhubaneswar, a company constituted under the Companies Act-1956 (hereinafter called OPTCL) has invited Tender vide e-NIT No……. Dated…… for the purpose of …… work under Package(s) No……../ purchase of ---------- .

1. Now, therefore, in accordance with Notice Inviting Tender (e-NIT) No…….. Dated …… of OPTCL, Ms/Shri……Address……..... Wish / wishes to participate in the said tender and as a Bank Guarantee for the sum of Rs……. [ Rupees in ***words***---------- ] valid for a period of ……days is required to be submitted by the bidder, as per Tender Specification, we the _____ ) [indicate the name, Address & Code of the bank] [hereinafter referred to as "Bank"] at the request of Ms/Shri…….... [hereinafter referred to as "Bidder"] do hereby unequivocally and unconditionally guarantee and undertake to pay during the above said period on written request by the <Tender Issuing Authority, Central Procurement Cell (CPC) ODISHA POWER TRANSMISSION CORPORATION Ltd. , Bhubaneswar an amount not exceeding Rs……. to OPTCL., without any reservation. The guarantee would remain valid up to …….. [Date] and if any further extension to this is required, the same will be extended on receiving instruction from ---------- on whose behalf this Bank Guarantee has been issued.

2. We, the _____ [indicate the name of the Bank, Address, Code] do hereby further undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from OPTCL. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs…… ( Rupees in words……)

3. We undertake to pay to OPTCL any money so demanded not withstanding any dispute or disputes so raised by the bidder in any suit or proceeding instituted/pending before any court or tribunal relating thereto, our liability under this present being absolute

and unequivocal. The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the bidder shall have no claim against us for making such payment.

4. We, the _____ Bank further agree that the guarantee herein contained shall remain in full force and effect during the aforesaid period of _____ days [in words]…….. (as per Tender Specification) and it shall continue to be so enforceable till all the dues of OPTCL under or by virtue of the said Bid have been fully paid and its claims satisfied or discharged or till OPTCL certifies that the terms and conditions of the said Bid have been fully and properly carried out by the said bidder and accordingly discharges this guarantee. Unless a demand or claim under this guarantee is made on us or our Branch Office at Bhubaneswar <Mention Name, Address & Code of the Branch Office at Bhubaneswar of Issuing Bank> in writing on or before _____ we shall be discharged from all liability under this guarantee thereafter.

5. We the _____ Bank further agree with OPTCL that OPTCL shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Bid or to extend time of performance by the said Bidder from time to time or to postpone for any time or from time to time any of the powers exercisable by OPTCL against the said Bidder and to forbear or enforce any of the terms and conditions relating to the said Bid and we shall not be relieved from our liability by reason of any such variation, postponement or extension granted to the Bidder or for any forbearance, act or omission on the part of OPTCL or any indulgence by OPTCL to the said Bidder or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have the effect of so relieving us.

6 This guarantee will not be discharged due to the change in the name, style and constitution of the Bank and/or of the Bidder.

7 We _____ [indicate the name of Bank, Address &Code] lastly undertake not to revoke this guarantee during its currency except with the previous consent of OPTCL in writing .

8. We, the _____Bank (Name, Address & Code) further agree that this guarantee shall also be invokable at our place of business at ---------- Branch of **Bhubaneswar** (indicate Name, Address & Code of the Branch at Bhubaneswar) in the State of Odisha."

## " Notwithstanding anything contained herein"

a) Our liability under the bank guarantee shall not exceed Rs.----------(Rupees in words----------) only.

b) This Bank guarantee shall be valid up to ----------.

c) We or our Branch at Bhubaneswar <Mention Name, Address & Code…….> shall be liable to pay guaranteed amount or any part thereof under this guarantee only if you serve upon us at--------- Branch of Bhubaneswar a written claim or demand on or before ……,

The Bank Guarantee is issued in paper form and Advice transmitted through SFMS with required details to the beneficiary's advising bank (ICICI Bank Bhubaneswar, IFSC Code ICIC0000061).

Dated, the _____Day of _____

For _____ [Indicate name of Bank]

Signature ……
Full name …….
Designation ……
Power of Attorney No. …….
Date…….
Seal of the Bank…….

**WITNESS: (SIGNATURE WITH NAME AND ADDRESS)**
(1)
Signature ……
Full name …….
(2)
Signature ……
Full name …….

N.B.:

1. Name of the Bidder.: ……
2. BG No & Date :……
3. Amount (In Rs.):……
4. Validity up to :……
5. E-NIT No……..
6. Package/Works No……..
7. Name, Address & Code of Issuing Bank:……
8. Name, Address & Code Bhubaneswar Branch of the Issuing Bank:……
9. The Bank Guarantee shall be accepted after getting SFMS advice as per details below.

## Format for SFMS details

| Sl. No | PARTICULARS | TYPE | DETAILS |
|---|---|---|---|
| 1 | Type of Bank Guarantee | Mandatory | EMD |
| 2 | Currency & Amount | Mandatory | |
| 3 | Validity Period(from—to --) | Mandatory | |
| 4 | Effective Date | Mandatory | |
| 5 | End date of lodgment of Claim | Mandatory | |
| 6 | Place of lodgment of claim | Mandatory | Bhubaneswar,<br>Branch Name------ of Bhubaneswar<br>Branch code------- of Bhubaneswar<br>Branch Address ------ at Bhubaneswar |
| 7 | Issuing Branch IFSC Code | Mandatory | |
| 8 | Issuing Branch name & address | Mandatory | |
| 9 | Name of applicant and its details | Mandatory | |
| 10 | Name of Beneficiary and its details | Mandatory | |
| 11 | Beneficiary's Bank/Branch and IFSC Code | Mandatory | ICICI Bank Ltd<br>IFSC Code-ICIC0000061 |
| 12 | Beneficiary's Bank/Branch name and address | Mandatory | ICICI Bank Ltd<br>Bhubaneswar Main |

| | | | |
|---|---|---|---|
| | | | Branch, Bhubaneswar |
| 13 | Sender to receiver information | Mandatory | |
| 14 | Purpose of Guarantee | Mandatory | EMD |
| 15 | Reference/Description of the underlined tender/contract | Mandatory | NIT No |

## ANNEXURE-VII

## [PROFORMA FOR COMPOSITE BANK GUARANTEE FOR SECURITY DEPOSIT PAYMENT AND PERFORMANCE]

**(To be stamped in accordance with Stamp Act and the Non-Judicial stamp paper of appropriate value should be in the name of the Issuing Bank.)**

**Ref No:- …….**

**Bank Guarantee No. …….**
**Date: ……**
**BG Amount:…….**
**Validity Period:……..**

This Guarantee Bond is executed this…… day of …… by us the…… Bank at …… , P.O…… , Dist……, State…… and Code No……..

Whereas the ODISHA POWER TRANSMISSION CORPORATION Limited, Janpath, Bhubaneswar, a company constituted under the Companies Act-1956 (hereinafter called OPTCL) has issued Letter of Award (LOA) No…… Dated…… for the purpose of …… work under Package No……. (herein after called "the Agreement") to M/s/Shri …….. , Address…….. (herein after called the "Contractor") for supply, erection, installation & commissioning and associated civil works under the above LoA and whereas OPTCL has agreed (1) to exempt demand of security deposit under the terms and conditions of the LOA (2) to release payment of the cost of the Contract Price to the Contractor on furnishing by the Contractor to OPTCL a Contract Performance Bank Guarantee (CPBG) of the value of 10% of the Contract Price of the said Agreement.

1. Now therefore, in accordance with the terms and conditions of LOA No. _____ dated _____ for the due fulfillment by the said Contractor of the terms and conditions contained in the said agreement, on production of a Bank Guarantee for Rs._____ (Rupees_____) only,

we the bank _____ [Indicate bank Name , Address & Code ] (hereinafter referred to as "the Bank") at the request of M/s/Shri _____ contractor do hereby undertake to pay to OPTCL, an amount not exceeding Rs._____ (Rupees _____) only .

2. We, the _____ Bank [indicate the name of the Bank, Address & Code] do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from OPTCL. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____(Rupees---------- In Words).

3. We, the …… Bank also undertake to pay to OPTCL any money so demanded not withstanding any dispute or disputes raised by the Contractor in any suit or proceeding instituted / pending before any court or tribunal relating thereto, our liability under this present being absolute and irrevocable. The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the Contractor shall have no claim against us for making such payment.

4. We, the _____ Bank further agree that the guarantee herein contained shall remain in full force and effect during the aforesaid period of _____ days and it shall continue to be so enforceable till all the dues of OPTCL under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till OPTCL certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said contractor and accordingly discharges this guarantee.

Unless a demand or claim under this guarantee is made on us or our Branch Office at Bhubaneswar <Mention Name, Address & Code of the Branch Office at Bhubaneswar of issuing Bank> in writing on or before …… (Date), we shall be discharged from all liability under this guarantee thereafter.

5. We, the _____ Bank [indicate the name of the Bank, Address & Code] further agree with the Board that OPTCL shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Bid or to extend time or performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by OPTCL against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Bid and we shall not be relieved from our liability by reason of any such variation postponement or extension being granted to the said contractor(s) or for any forbearance, act or omission on the part of OPTCL or any indulgence by OPTCL to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have the effect of so relieving us.

6. This guarantee will not be discharged due to the change in the name, style or constitution of the Bank and/or of the contractor(s).

7. We, the _____ Bank [indicate the name of the bank, Address & Code ] lastly undertake not to revoke this guarantee during its currency except with the previous consent of OPTCL in writing.

8. We, the _____Bank (Name, Address & Code) further agree that this guarantee shall also be invokable at our place of business at **Bhubaneswar** (indicate Name, Address & Code of the Branch at Bhubaneswar) in the State of Odisha.

**“ Notwithstanding anything contained herein”**

a) Our liability under the bank guarantee shall not exceed Rs.----------(Rupees in words----------) only.

b) This Bank guarantee shall be valid up to ----------.

c) We or our Branch at **Bhubaneswar** <Mention Name, Address & Code…….> shall be liable to pay guaranteed amount or any part thereof under this guarantee only if you serve upon us at--------- Branch of Bhubaneswar a written claim or demand on or before …….,

The Bank Guarantee is issued in paper form and Advice transmitted through SFMS with required details to the beneficiary’s advising bank (**ICICI Bank Bhubaneswar**, IFSC Code ICIC0000061).

Dated, the _____Day of _____
For _____ [Indicate name of Bank]

Signature……..

Full Name…….

Designation……..

Power Of Attorney……..

Dated……

Seal of the Bank……..

**WITNESS: (SIGNATURE WITH NAME AND ADDRESS)**

1.Signature…….

Full Name…….

2. Signature…….

Full Name…….

N.B.:

1. Name of the Contractor.: ……
2. BG No & Date :……
3. Amount (In Rs.):……
4. Validity up to :……
5. LOA No……..
6. Package No……..

7. Name, Address & Code of Issuing Bank:……

8. Name, Address & Code of Bhubaneswar Branch of the Issuing Bank:……

10. The Bank Guarantee shall be accepted after getting SFMS advice as per details below.

## Format for SFMS details

| Sl. No | PARTICULARS | TYPE | DETAILS |
|---|---|---|---|
| 1 | Type of Bank Guarantee | Mandatory | Contract Performance |
| 2 | Currency & Amount | Mandatory | |
| 3 | Validity Period(from—to --) | Mandatory | |
| 4 | Effective Date | Mandatory | |
| 5 | End date of lodgment of Claim | Mandatory | |
| 6 | Place of lodgment of claim | Mandatory | Bhubaneswar,<br>Branch Name------ of Bhubaneswar<br>Branch code------- of Bhubaneswar<br>Branch Address ------ at Bhubaneswar |
| 7 | Issuing Branch IFSC Code | Mandatory | |
| 8 | Issuing Branch name & address | Mandatory | |
| 9 | Name of applicant and its details | Mandatory | |

| | | | |
|---|---|---|---|
| 10 | Name of Beneficiary and its details | Mandatory | |
| 11 | Beneficiary's Bank/Branch and IFSC Code | Mandatory | ICICI Bank Ltd<br>IFSC Code-ICIC0000061 |
| 12 | Beneficiary's Bank/Branch name and address | Mandatory | ICICI Bank Ltd<br>Bhubaneswar Main Branch, Bhubaneswar |
| 13 | Sender to receiver information | Mandatory | |
| 14 | Purpose of Guarantee | Mandatory | Contract Performance |
| 15 | Reference/Description of the underlined tender/contract | Mandatory | LOA No---- |

## ANNEXURE-VIII

## [CHART SHOWING PARTICULARS OF EARNEST MONEY DEPOSIT FURNISHABLE BY TENDERERS]

| | | |
|---|---|---|
| 1. | Central and State Government<br><br>Undertakings | Exempted |
| 2. | All other inside & outside state units. | The amount of EMD as specified in the specification /Tender Notice in shape of bank guarantee /DD. |

NB: - **REFUND OF E.M.D.**

[a] In case of unsuccessful tenderers, the EMD will be refunded immediately after the tender is decided. In case of successful tenderer, this will be refunded only after furnishing of Composite Bank Guarantee referred to in clause No.19 of Section-II of this specification.

Suits, if any, arising out of EMD shall be filed in a court of law to which the jurisdiction of High Court of ODISHA extends.

[b] Earnest Money will be forfeited if the tenderer fails to accept the letter of intent/purchase order, issued in his favour or revises the bid price[ s] within the validity period of Bid.

## ANNEXURE-IX

*DATA ON EXPERIENCE*

[a] Name of the manufacturer.

[b] Standing of the firm as manufacturer of equipment quoted.

[c] Description of equipment similar to that quoted [supplied and installed during the last two years with the name of the organizations to whom supply was made].

[d] Details as to where installed etc.

[e] Testing facilities at manufacturer's works.

[f] If the manufacturer is having collaboration with another firm, details regarding the same and present status.

[g] A list of purchase orders, executed during last three years.

[h] A list of similar equipment of specified Rating/ capacity, voltage class, Designed, manufactured, tested and commissioned which are in successful operation for at least two years from the date of commissioning with legible user's certificate. User's full complete postal address/fax/phone must be indicated. (Refer clause No.7 of the Part-I, Section-II of the specification).

Place:

Date:

Signature of tenderer

Name, Designation, Seal

**ANNEXURE-X**

SCHEDULE OF SPARE PARTS FOR FIVE YEARS OF NORMAL OPERATION & MAINTENANCE

| SL. No | Particulars | Quantity | Unit delivery rate | Total price |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Place:

Date:

Signature of Tenderer

Name, Designation, Seal

**ANNEXURE-XI**

**SCHEDULE OF INSTALLATIONS**.

| Voltage Class, Rating/Capacity | Rated Voltage | Place of installation and complete postal address | Year of commissioning |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Place: -

Date

Signature of Tenderer:

Name, Designation, Seal

**ANNEXURE-XII**

**DEVIATION SCHEDULE**.

**Tenderer shall enter below particulars of his alternative proposal for deviation from the specification, if any**.

A) Technical

| Sl.No | Clause No. of specification | Particulars of deviations. |
|---|---|---|
| | | |
| | | |

Place: -

Date

Signature of Tenderer:

Name, Designation, Seal

B) Commercial deviations.

A) Commercial.

| Sl.No | Clause No. of specification . | Particulars of deviations. |
|---|---|---|
| | | |
| | | |

Place: -

Date

Signature of Tenderer:

Name, Designation, Seal

**ANNEXURE – XIII**

**LITIGATION HISTORY**

| Year. | Award for or against bidder | Name of client, cause of litigation and matter in dispute | Disputed amount (current value in Rs.) |
|---|---|---|---|
| | | | |
| | | | |

Place: -

Date

Signature of Tenderer:
Name, Designation, Seal

# PROFORMA OF EXTENSION OF BANK GUARANTEE

**(To be stamped in accordance with Stamp Act and the Non-Judicial stamp paper should be in the name of the issuing Bank)**

**Ref No:- …….** **Date:- ……**

**Sub: Extension of Bank Guarantee No. ……..for Rs. …… favouring yourselves, expiring on ……on account of M/s. ……. in respect of LOA No. …… dated ……. (hereinafter called original Bank Guarantee).**

At the request of M/s. ……., we…… Bank, branch office at ……..and having its Head Office at …….. do hereby extend our liability under the above mentioned Guarantee No. ……. Dated ……..for a further period of ……..years / months/ days from ……. to expire on ……..,except as provided above, all other terms and conditions of the original Bank Guarantee No. …….. dated ……. shall remain unaltered and binding.

Please treat this as an integral part of the original Bank Guarantee to which it would be attached.

**" Notwithstanding anything contained herein"**

a) Our liability under the bank guarantee shall not exceed Rs.----------(Rupees in words----------) only.

b) This Bank guarantee shall be valid up to ----------.

c) We or our Branch at **Bhubaneswar** <Mention Name, Address & Code…….> shall be liable to pay guaranteed amount or any part thereof under this guarantee only if you serve upon us at--------- Branch of Bhubaneswar a written claim or demand on or before ……,

The Bank Guarantee extension is issued in paper form and Advice transmitted through SFMS with required details to the beneficiary's advising bank (ICICI Bank Bhubaneswar, IFSC Code ICIC0000061).
Dated this ..... Day of .....20..... at .....

For ……[Indicate name of the Bank]

Signature……

Full Name …….

Designation ……..

Power Of Attorney No……

Seal of the Bank……..

**NOTE :** i) SFMS advice as per details below.

## Format for SFMS details

| Sl. No | PARTICULARS | TYPE | DETAILS |
|---|---|---|---|
| 1 | Type of Bank Guarantee | Mandatory | EMD/Contract Performance/ . . . . |
| 2 | Currency & Amount | Mandatory | |
| 3 | Validity Period(from—to --) | Mandatory | |
| 4 | Effective Date | Mandatory | |
| 5 | End date of lodgment of Claim | Mandatory | |
| 6 | Place of lodgment of claim | Mandatory | Bhubaneswar, Branch Name------ of Bhubaneswar Branch code------- of Bhubaneswar Branch Address ------ at Bhubaneswar |
| 7 | Issuing Branch IFSC Code | Mandatory | |
| 8 | Issuing Branch name & address | Mandatory | |
| 9 | Name of applicant and its details | Mandatory | |
| 10 | Name of Beneficiary and its details | Mandatory | |
| 11 | Beneficiary's Bank/Branch and IFSC Code | Mandatory | ICICI Bank Ltd IFSC Code-ICIC0000061 |
| 12 | Beneficiary's Bank/Branch name and address | Mandatory | ICICI Bank Ltd Bhubaneswar Main Branch, Bhubaneswar |

| | | | |
|---|---|---|---|
| 13 | Sender to receiver information | Mandatory | |
| 14 | Purpose of Guarantee | Mandatory | EMD/Contract Performance/ . . . . |
| 15 | Reference/Description of the underlined tender/contract | Mandatory | NIT No/LoA No . . . . . |

**PART – II**
**PRICE BID**

**1. PRICE:**

(i) Bidders are required to quote their price(s) for goods offered indicating they are 'FIRM'

(ii) The prices quoted shall be FOR Destination only at the consignee's site/store inclusive of packing, forwarding, Freight & Insurance. In addition, the break-up of FOR Destination price shall be given as per schedule of Prices in Annexure-V of Section – III. The Bidders has to certify in the price bid that any implication of lower Tax and Input Tax Credit benefit as per anti-profiteering and other provisions under GST Laws, have been fully passed on to the Purchaser, while quoting the tender prices.

**2. INSURANCE:**

Insurance of materials/equipments, covered by the Specification should normally be done by the Suppliers with their own Insurance Company unless otherwise stated. The responsibility of delivery of the materials/equipments at destination stores/site in good condition rests with the Supplier. Any claim with the Insurance Company or Transport agency arising due to loss or damage in transit has to be settled by the Supplier. The Supplier shall undertake free replacement of equipments/materials damaged or lost which will be reported by the Consignee within 30 days of receipt of the equipments/materials at Destination without awaiting for the settlement of their claims with the carriers and underwriters.

**3. CERTIFICATE FOR EXEMPTION FROM GOODS AND SERVICES TAX:**

Offers with exemption from Goods and Services Tax shall be accompanied with authenticated proof of such exemption. Authenticated proof for this clause shall mean Photostat copy of exemption certificates, attested by Gazetted Officers of State or Central Government.

**4. PROPER FILLING UP OF THE PRICE SCHEDULE:**

The Bidders should fill up the price schedule (Annexure-V of Section-III) properly and in full. The tender may be rejected if the schedule of price is submitted in incomplete form as per clause-34 (ix) of Section-II of the Specification.

**5. NATURE OF PRICE INDICATED IN SPECIFICATION SHALL BE FINAL.**

The nature of price indicated in the Clause-13, Section – I of PART –I of the Specification shall be final and binding.

# Section IV

# TECHNICAL SPECIFICATION OF RTU & CONTROL AND POWER CABLE

**TENDER SPECIFICATION NO.**
**Sr.G.M.-CPC –e-Tender-Telecom-RTU-46 /2018-19**

**Volume-I**

## Contents

# Volume-II



# TECHNICAL SPECIFICATION OF RTU

## 1.0 SCOPE and General Technical Specification

**SCOPE**:
(i) The scope of the contract shall be the design, manufacture, assembly, inspection and testing at the manufacture's work, packing and delivery F.O.R. (destination) of the RTU (Configured with required MFT, CMR, OLTC transducer, etc. along with associated accessories as specified for the respective stations) and erection & commissioning of the RTU at the consignee's site and rendering services in accordance with the enclosed technical specification and bill of quantity.

(ii) The scope covers Supply & commissioning of LDMS with each of the RTU. The LDMS shall be supplied along with the required UPS as specified in the technical specification.

(iii) The scope also covers supply & laying of required interface cable/data cable for CT, PT, DI, Transducer and AC/DC Power supply for the erection & commissioning of the RTU. The said

cables are to be supplied meeting to the specification mentioned elsewhere in this specification. The tentative requirement of such cables has been specified in the BOQ and in the technical specification, Section-IV, volume-II for cables.

(iv) The bidder shall offer such above said cables from among the approved vendors of OPTCL only conforming to the standard and specification laid down in the Technical specification (Section-IV, Vol-II). The approved vendors list of OPTCL is enclosed with the tender document in Annexure-IV

(v) The contractor has to carry out survey for the exact requirement of such cables at all the sites and submit the survey report jointly signed by the respective site in-charge to the employer for approval and for subsequent amendment to the work order if there is a change in the BOQ in respect of cables and accessories. The contractor shall survey the proposed RTU stations prior to bidding at their own cost.

(vi) Such supply & commissioning of RTU shall be made against replacement of existing RTU (model: S-900) of the then M/s Areva make and against some new stations. These old RTUs to be replaced are presently operational at the stations detailed at Appendix-II (A,B&C) of technical specification, section-IV. Hence utmost care should be taken to optimize the minimum data interruption.

(vii) The contractor has to dispatch the RTU and the required MFT, CMR, OLTC transducer, etc along with the required interface cable/data cable for CT, PT, DI, Transducer and AC/DC Power supply to the designated site.

(viii) The RTU at the respective stations shall be installed and commissioned along with all the cabling work for the connection and shall be tested locally. The integration of the RTU with the central SCADA are not within the scope of this contrac
t. However the contractor shall extend full cooperation at the scheduled time of such integration with the SCADA OEM.

(ix) The scope of the work further includes comprehensive annual maintenance contract of the configured RTU so commissioned for a period of 5(Five years) as per the specification at section-V of the tender specification.

**General Technical Specification:**

The Remote Terminal Unit (RTU) shall be installed at Substations & Power stations to acquire analog data and device status signals. RTU shall also be used for control of station devices from Master station. The supplied RTUs shall be interfaced with the Control & Relay (C&R) panels, communication equipment, power supply distribution boards; for which all the interface cables shall be supplied by the Contractor.

This document describes the specifications for the Remote Terminal Unit (RTU). Contractor shall supply RTU, associated equipment such as transducers, relays, weather sensors, modems, cabling etc. and required number of panels for housing of all the hardware envisaged for the RTU and system interface cubicle (SIC).

The contractor shall be responsible for supplying all hardware, software, installation, cabling and field implementation for RTU as defined in this Specification. The contractor shall also provide complete documentation, training and testing to fully support the hardware and software provided. The RTU shall be used for real-time supervision and control of substation/ power plant through SCADA system. RTU configuration/ point count, transducer count and requirement of weather sensors quantity is given in **AppendixA.**

It is Employer's intent that the Contractor uses as much standard hardware and soft-ware as possible; however, all of the functional requirements of this Specification must be satisfied. The

use of the Contractor's standard hardware and software may cause the Contractor to conclude that there is a need for additional items not specifically mentioned in this Specification. The Contractor shall supply all such items and provide a complete RTU design that meets all of the Employer's functional requirements defined in this Specification.

The Weather Sensors to be supplied under the project shall be field proven and shall have been in successful operation for meteorological application for at least one year as on date of Bid opening. The Bidder shall furnish the documentary evidence in support of the above and submit the same along with the bid.

The equipment for which GTP is not specified by OPTCL, the same shall be supplied only after obtaining approval from OPTCL.

## 1.1 Design Standards

The RTUs shall be designed in accordance with applicable International Electro-technical Commission (IEC), Institute of Electrical and Electronics Engineer (IEEE), American National Standards Institute (ANSI), and National Equipment Manufacturers association (NEMA) standards and British Standards, unless otherwise specified in this Technical specification. In all cases the provisions of the latest edition or revision of the applicable standards in effect shall apply.

## 1.2 RTU Functions

All functional capability described herein shall be provided by the Contractor even if a function is not initially implemented. The term master station is used to denote the SCADA systems. As a minimum, the RTUs shall be capable of performing the following functions:

(a) Collecting and processing the digital status inputs, analog inputs, accumulated values and transmitting to master station(s)

(b) Receiving and processing digital & analog control commands from the master station(s)

(c) Accepting polling messages from at least three master station(s) simultaneously using separate logical databases for each master station.

(d) Communication simultaneously on all Communication ports (as per cl. 1.3) and using multiple concurrent protocols, including the IEC 60870-5-101, 60870-5-104 & MODBUS/103 protocol.

(e) Data transmission rates from 300 to 9600 baud for serial ports (for both IEC 60870-5-101 & MODBUS/103) and 10/100 Mbps for TCP/IP Ethernet ports.

(f) RTU shall be compatible with protocol 61850 for communication with IEDs.

(g) RTU shall have the capability of automatic start-up and initialisation following restoration of power after an outage without need of manual intervention. All restarts shall be reported to the connected master station(s).

(h) RTU shall support time synchronization through messages received from master station using IEC 60870-5-101 protocol.

(i) RTU shall support downloading of RTU database from the master station using Intranet

(j) RTU shall support SOE (Sequence of events) feature

(k) Acting as a data concentrator for acquiring data from Slave RTUs and exercising supervisory control on slave RTUs using IEC 60870-5-101 and IEC 60870-5-104 protocol.

(l) RTU shall support archiving facility for reporting and analysis. The archived data shall be saved to user defined file duration at user defined interval-eg. Every 5 minutes for a period of 1 week. The computation of the archived data shall also be supported – eg. Maximum, Minimum and Average.

## 1.3 Communication ports

The RTUs shall support simultaneous communications with multiple independent master stations (SCADA system), maintenance and configuration terminal (Laptop PC), Multi-function transducers and Local Data Monitoring System (LDMS).

The RTUs shall have communication ports as follows:

a) Two Ethernet ports for connectivity to Master Station on IEC 60870-5-104 and to relays on IEC 61850.

b) 2 RS232 ports –for communication with master stations on IEC 60870-5-101

c) One port for the RTU maintenance and configuration terminal.

d) Two ports for Local Data Monitoring System (LDMS).

e) Required number (minimum two) of RS 485 ports for polling Multi-function transducers using MODBUS/103 protocol in multi-drop (party line) mode. Maximum 8 nos MFMs shall be connected to each port.

It shall be possible to increase the number of communication ports in the RTU by addition of cards, if required in future. The RTU shall respond to independent scans and commands from Master Station, LDMS and Configuration & Maintenance Terminal simultaneously. The RTU shall support the use of a different communication data exchange rate (bits per second) and scanning cycle on each port.

## 1.4 Modems

The modems can be used for RTU communicating to master station. The Contractor shall supply two (2) number modems one at Control Centre/Stand alone and other at RTU end. For Critical RTUs, 4 nos modems are required, 2 nos. at Control Centerand 2 nos. at RTU End.

The modem for remote end, complete in all respects including power supply unit & rack shall be supplied. These modems can be located either in the FEP at Control Center end or at other Communication nodes (Stand Alone Modem).

The modems shall meet the following requirements:

a) Use CCITT Standards including V.24, V.28.

b) Use frequency shift keying (FSK) modulation.

c) Communicate at data rates of 300, 600 and 1200 bps.

d) Use CCITT R.38a, and R.38b standard tones for the selected RTU data rate.

e) Use PLCC bandwidth upto4khz and shall accommodate multiple data channels over and above voice channels.

f) Use both 2-wire and 4-wire communication lines.

g) Receive level adjustable from -8 to -40 dBm @ 600 ohms.

h) Transmit level adjustable from 0 to -24 dBm @ 600 ohms.

i) Have a minimum sensitivity of -48 dBm.

j) Shall operate on 48 VDC power supply

k) Compatible with IEC 101

## 1.5 Splitters

Splitters shall be provided for splitting of 60870-5-101 protocol communication ports to communicate with two terminal servers. The splitters shall be mounted in the panel for Terminal Servers and shall operate on 24 or 48 VDC.

## 1.6 Local Configuration & Maintenance Interface

The RTUs shall include the interface to support the portable configuration and maintenance terminal (PCMT). The interface shall provide easy access to allow employer to use the maintenance terminal at the RTUs installed in the field using Ethernet. Local Configuration & Maintenance Interface

## 1.7 Local Data Monitoring System (LDMS) Interface

The RTUs shall include the interface for communication with the LDMS system. The LDMS shall be used for local data acquisition, monitoring and control of substation parameters through RTU. The scope of LDMS shall include installation and integration of LDMS software on a Personal computer.

The LDMS shall be a mini SCADA system providing MMI capability for use in the sub-station control room building. The LDMS software shall include following functions:

I. data acquisition for analog, digital and pulse accumulator type data

II. data processing – Conversion to engineering units , limit monitoring, data validity test, calculated data

III. calculated data (such as maximum, minimum, average values with associated time-stamping etc.) of all the station parameters.

IV. Time Synchronization

V. Sequence of Events Processing

VI. Supervisory control

VII. Alarm, tagging, trending, quality codes etc.

VIII. Single Line Diagrams, Trends, daily, weekly, monthly reports etc. shall be prepared by the bidder and integrated on LDMS system. The LDMS shall also have capability to generate additional displays, single line diagrams, reports , and trends.

The LDMS shall store all real-time telemetered & calculated data every ***1 minute*** (adjustable to 15,30,45,60 minutes). The software and hardware shall be sized for storage of all above data at every 5 minutes for at least six months duration. All alarms, events, SOE etc. shall also be stored on regular basis. It shall be possible to define daily, weekly, monthly Substation

reports on LDMS. It shall be possible to generate reports highlighting the maximum, minimum, average with associated time-stamping etc. of all the station parameters. The historical data stored on the storage medium shall be in standard format and necessary tools for its export to standard spreadsheet programs(Excel) shall be provided.

The LDMS shall update analog data from RTU less than ten seconds (programmable) and status data by exception. The SOE status data shall be recorded with resolution of 10 ms timestamp.

The contractor shall provide 1 no, 1 kVA inverter of reputed make without battery. (Input from 48 VDC with -10% to 20 % variation, Output 230 VAC +/- 2% suitable for single computer load) with each LDMS system. The contractor will use the 48 VDC power supply available in RTU.

## 1.8 Communication interface between RTU & MFMs

The RTU shall acquire data from the MFMs. The MFMs will act as slave to the RTU. The RTU shall have the ability of issuing retry scan to acquire data from the MFMs in case of communication failure between RTU and MFMs. All data from the devices connected on a single port shall be acquired within 5 seconds.

## 1.9 Communication Protocol between RTU & IEDs

The RTU shall use the IEC 61850 protocol for communication with IEDs over Sub-station LAN. The RTU shall act as a Client and collect data from the IEDs).

The RTU shall store the data acquired from the MFMs & IEDs in its database and do processing like change detection/deadband processing on the data for optimizing its transmission to the Master Station (SCADA Control Centre). The processing shall include requirements of mapping of information from the protocol of MFM/IEDs to the protocol requirement for communication with Control Center.

## 1.10 Master Station Communication Protocol

The Contractor shall provide a communication protocol for communicating with SCADA master stations using the IEC 60870-5-101 and IEC 60870-5-104communication protocol standard. The communication protocol shall support all the requirements of this standard. The communication protocol shall be non-proprietary and the Contractor shall provide complete description and documentation of the protocol to Owner.

The RTU shall perform as a slave to SCADA master station when using the IEC 60870-5-101 protocol. All communication shall be initiated by the SCADA master stations. RTU must notify the master stations of unusual conditions at the RTU (such as a power fail/restoration or RTU malfunction), the transfer of changed data etc. All the notifications shall be accomplished within the framework of the periodic data acquisition exchanges.

The RTU shall process the various messages/commands for communication to the Master station using the following priority.

a) Control command

b) Status data by exception

c) Analog data by exception

d) Analog data periodic

e) Status data integrity scan

The communication interface to the master station(s) shall allow scanning and control of defined points within the RTU independently for each master station using a separate logical database in the RTU. It shall be possible to pick points from the RTU database randomly and assign it for reporting to a Master station. Further, the RTU shall support the use of a different communication data exchange rate (bits per second), scanning cycle, and/or communication protocol to each master station.

### 1.10.1 Scan groups

Analog and digital input points (including points reported by exception) shall be assignable to scan groups using the IEC 60870-5-101and IEC 60870-5-104 protocol profile communication protocol standard. A scan group shall be a specified set of data points within the RTU central database which will be communicated to a master station when requested by a specific (addressed) scan request. A scan group size shall only be limited by the communication protocol message length. Any RTU input point shall be assignable to any scan group. The RTUs shall support at least sixteen scan groups and all scan groups per communication port (i.e. master station/ LDMS interface). The Contractor shall provide a convenient and flexible scheme for assigning points in the RTU to scan groups.

### 1.10.2 Reporting of status points

The RTU communication protocol shall be configured to report digital status changes by exception to master station using the IEC 60870-5-101 and IEC 60870-5-104 protocol profile communication protocol standard. Digital status data shall have higher priority than the Analog data. All the digital status data shall also be assigned to scan groups for integrity check by Master stations at every 10 minutes.

### 1.10.3 Reporting of Analog points

The analog data shall be reported periodically to update all the values at the master station within 10 to 15 seconds using IEC 101 /104 protocol profile . Analog data shall also be reported by exception if the analog value exceeds its previous value by more than **10%.**

### 1.10.4 Digital control commands

The RTU shall follow the select-and-execute sequence for operation of digital control commands from the master station using the IEC 60870-5-101 and IEC 60870-5-104 protocol profile communication protocol standard. The RTU shall reset its control logic upon any error in the sequence.

## 1.11 Data Concentrator Communication Protocol

The RTU shall act as a IEC 60870-5-101 and IEC 60870-5-104 protocol master and collect data and also perform supervisory control from/on the slave RTUs and communicate it to the Control Center. The Master protocol implementation shall be such that the data polling requirements mentioned at section 1.10 is at least accomplished.

RTU as a Data concentrator shall be provided with at least ten (10) IEC 101 input ports/ cards and shall have capability to report to two master stations on IEC 104 interface. Data concentrator shall support at least 1,500 (fifteen hundred) data points. The RTU as a Data Concentrator shall be

supplied with GPS receiver system with antenna, cable etc. for time stamping of Data concentrator which in turn shall synchronize the IEC 101 protocol
connected RTU/device. The RTU as a Data Concentrator shall come complete with built in monitoring mechanism to avoid loss of any data, especially the one reported by exception. The data concentrator shall have dual CPU and dual Power supply unit. The overall data update requirement from any Sub-RTU to Control centre should not affect the functionality defined elsewhere in the specification.

The Data concentrator shall have the provision for remote login from Control centre. The SLDC computer system shall be able to configure and poll health of Data concentrator from remote on 104 connected interface after due authentication of the users.

It shall support diagnostic & maintenance activities remotely. Individual RTU configuration shall be possible from Data Concentrator including accommodating devices from heterogeneous suppliers. The RTU as a Data Concentrator shall have following communication ports & support for protocols:

i. IEC104 for SCADA control centers. ii.
IEC101 for Sub-RTUs.
iii. IEC 101/104 for local SCADA

The other requirements given for RTU elsewhere in the specification shall be applicable to RTU as a Data concentrator also

## 1.12 Analog Inputs

The RTU shall accommodate analog inputs which are unipolar or bipolar, 2-wire ungrounded differential signals. RTU shall be capable of accepting other standard analog input ranges (0 to 5V, 0 to 10mA, +/- 10 mA, 4-20 mA).

The RTU shall make all appropriate signal level conversion and conditioning to allow full utilization of analog inputs and meaningful reasonability checking. The analog-to-digital converter shall have a minimum resolution of 2048 counts (sign plus 11 data bits). Each type of analog input shall be converted with full resolution. The RTU shall monitor the drift in characteristics of its ADC and mark the analog points with a drift quality code if a drift is detected. This drift quality code shall be sent to the master station also.

The RTU accuracy, for analog input measurement, shall be 99.8% or better at 25 degree C ambient temperature. Mean accuracy shall drift no more than 0.002% per degree C within the temperature range of –5 to +55 degree C. Determination of accuracy shall be made while the analog multiplexer is operating at rated speed.

Each input shall have suitable protection and filtering to provide protection against voltage spikes and residual current at 50 Hz, 0.1 ma (peak-to-peak) and overload. Loading upto 150% of the input value shall not sustain any failures to the RTU input. The total input impedance offered by the RTU shall not be greater than 250Ω (for +4 to +20 mA range).

All analog inputs shall be scanned by the RTU from the field at least at 1 second periodicity.

## 1.13 Status Inputs

RTU shall be capable of accepting isolated dry (potential free) contact status inputs. The RTU shall provide necessary sensing voltage, current, optical isolation and de-bounce filtering independently for each status input. The sensing voltage shall not exceed 48 Vdc. The sensing voltage source shall be isolated from that of the RTUs logic power so that any noise or a short circuit across the sensing supply of a digital status input terminals would not disrupt the RTU operation other than the shorted digital status input.

The RTU shall be set to capture contact operations of 20 ms or more duration. Operationsof less than 20 ms duration shall be considered no change (contact bounce condition). The RTU shall accept two types of status inputs i.e. Single point Status inputs and Double point status inputs.

Single point status input will be from a normally-open (NO) or normally-closed (NC) contact which is represented by 1-bit in the protocol message.

Double point status input will be from two complementary contacts (one NO and one NC) which is represented by 2-bits in the protocol message. A switching device status is valid only when one contact is closed and the other contact is open. Invalid states shall be reported when both contacts are open or both contacts are closed.

All status inputs shall be scanned by the RTU from the field at 1 millisecond periodicity.

### 1.13.1 Contact Multiplying Relay

Contact multiplying relays (CMRs) are required to multiply the auxiliary contacts of breaker/isolators etc. The contacts of these relays shall be used to provide status input to the RTUs. The relays shall be of self-reset type. The relay shall have a minimum of two changeover contacts each with minimum current carrying capacity of 5 A at 110V/220 V DC.
The relays shall conform to the following requirements:

a) Power frequency withstand voltage: 2 kV for 1 minute as per IEC standards.

b) Insulation resistance of 100 Mohms at 500 V DC.

c) 5 KV Impulse test as per IEC standards

The CMRs shall be generally mounted in existing control & Relay panel but in case of non-availability of space, it shall be accommodated in the System Interface Cabinets (being supplied by the Contractor).

### 1.13.2 Momentary Change Detection

Two-state status input points with momentary change detection shall be used by Employer for points where multiple operations (changes of state) can occur between scans from the master station (such as breakers with auto-reclosing devices that operate faster than the master station scan rate). The RTU shall capture and maintain all of the momentary changes, up to 4 per MCD digital status point. The MCD status input points shall be set to capture operations of greater than 20 ms duration.

Alternatively, the RTU can store and report the multiple state changes of a digital input as discrete events. It shall be ensured that all the changes are reported to the Master station in the sequence in which they occur in the RTU.

## 1.14 Digital Telemetry

Digital telemetry input points shall be provided for sixteen bit inputs from employer telemetry contacts. The digital telemetry may use BCD, (4 bit decimal character without sign) and/or binary (16 bit) codes.

## 1.15 Sequence of Events (SOE) feature

SOE is the time-stamped digital status data. SOEs will enable Employer's personnel to determine the sequential operation of digital status input devices for their state changes. The RTU shall time-stamp the digital status data with a time resolution of one millisecond.

Initially, all breakers & protection contacts digital status input points in the RTU shall be configured as SOE points. However it shall be possible to assign any digital status input data point in the RTU as SOE point.
Each time a SOE status input point changes state, the RTU shall time-tag the change and send it to the Master station. The RTU shall maintain a SOE buffer within the RTU for communication delays and communication failure. SOE buffer shall be sized to store, as a minimum, of 1024 events. The RTU shall transmit the SOE data stored in its buffer to master station. An acknowledgement of receipt by the master station shall be made prior to the loss of any data in the RTU SOE buffer. Data not received at the master station shall be retransmitted. The RTU shall send a message to the master station to indicate the RTU SOE data buffer overflow condition.

## 1.16 Control Outputs

The RTU shall provide the capability for a master station to select and change the state of digital output points. Device control will be used by employer to control power system devices including:

(a) Two-state Devices: Circuit breakers, motor-operated switches, auto/manual switches, relay disable/enable, and other two-state devices

(b) Variable Output Devices: Raise/lower control of generators, transformer load-tap-changers (LTC), and other variable output devices.

The RTUs shall have the capability for control outputs as described in the following sections

### 1.16.1 Two State Momentary Control

A pair of outputs shall be supplied for each two-state (open/close) control output point that drive control relays. One output shall be supplied for open, the other for close. Upon command from a master station using the check-before-execute sequence, the appropriate control output shall be operated for a preset (momentary) time period. The operation period shall be adjustable for each point from 0.1 to 2 seconds.

### 1.16.2 Raise/Lower Pulse Output

A pair of outputs shall be supplied for each (raise/lower) control output point that drive control relays. One output shall be supplied for raise, the other for lower. When commanded from the master station, the appropriate raise or lower output shall be
operated for the selected time interval. The closure time interval for raise/lower pulse output points shall be specified in the operate command from the master station. The raise/lower output for each point shall operate over a range of 0.1 to 4 seconds in a minimum of eight equal increments.

### 1.16.3 Control Output Interposing Relays (Double Contact Digital Output)

Control output interposing relays shall be supplied by the Contractor for each control output specified in appendix. Each control relay shall consist of two isolated single-poledouble-throw contacts. The output contacts shall be rated to carry minimum current of 10 amps at 220 V DC, and shall provide arc suppression to permit interruptions of an inductive load. Relay coils shall be

shunted with diodes to suppress inductive transients associated with energizing and de-energizing of the relay coils. The relays shall conform to the IEC standards.

### 1.16.4 Latching (Dummy Breaker) Relay

The Contractor shall provide a latching relay to be used to simulate and test supervisory control from the RTU. The simulation relay shall accept the control signals to open and close from the RTU, and shall provide the correct indication response through a single contact indication input point. This point is not included in the RTU point count in **Appendix A.**

### 1.16.5 Control Security and Safety Requirements

The RTU shall include the following security and safety features as a minimum for control outputs:

(a) Select-and-execute sequence for control output.

(b) No more than one control point shall be selected at any given time.

(c) The control selection shall be automatically cancelled if after receiving the "control selection" message, the "control execute" command is not received within the set time period.

(d) The control selection shall be automatically cancelled if after receiving the "control selection" message, the "operate" command is not the next received message and is not received within the set time period.

(e) No control command shall be generated during power up or power down of RTU.

### 1.16.6 Local/Remote selector switch

A manual Local/Remote selector switch shall be provided for each RTU to disable all control outputs by breaking the power supply connection to the control outputs. When in the "Local" position, the Local/Remote switch shall allow testing of all the control outputs of RTU without activating the control outputs to field devices. A status input indication shall be provided for the Local/Remote switch to allow the SCADA system to monitor the position of the switch. This point is not included in the RTU point count defined in Appendix A.

## 1.17 Time facility

The RTU shall have an internal clock with the stability as defined in **Table-1.** The RTU shall be synchronised through synchronisation message from master station at every 10 minutes using IEC 60870-5-101 protocol. The RTU shall support the calculation of the propagation delay dynamically by the Master station. However, all the RTUs shall have a suitable interface for receiving synchronization signals from a local GPS receiver.

**The RTUs communicating over IEC-60870-5-104 shall be supplied with a GPS receiver for synchronization of RTU clock**The RTU shall synchronize its internal clock with the master station system clock when time synchronization messages are available and shall mark all the time stamped information/data as invalid when the RTU clock is not synchronised with the Master station.

To achieve the RTU internal clock stability of at least 1 ppm, the contractor shall supply RTUs with GPS. The internal GPS should also provide positional information for asset management.

## 1.18 Diagnostic features

The RTU design shall facilitate isolation and correction of all failures. The following features which promote rapid problem isolation and replacement of failed components shall be provided:

a) Self-diagnostic capabilities within each RTU which can be initiated at the RTU site. The diagnostic software shall check for memory, processor, and input/output ports errors and failures of other functional areas defined in the specification of the RTU.

b) On-line error detection capabilities within the RTU and detailed reporting to the connected master station of detected errors. It shall be possible to choose the errors to be sent to the Master station within the framework of the communication protocol.

c) Local indication of major RTU failures

d) A non-volatile event buffer that shall record all fatal errors/restarts/ faults. The RTU should archive the events on an External Storage device.

e) RTU should support SNMPv3 and Syslog.

f) RTU should have a inbuilt Web Browser application which can be accessed over Intranet from the Control Centre.

## 1.19 Input DC Power Supply

The RTU will be powered from a 48 V DC (+ve earthed) system. The RTU shall not place additional ground on the input power source. The characteristics of the input DC power supply shall be

(a) Nominal voltage of 48 Vdc with operation between 36 and 72 Vdc.

(b) Maximum AC component of frequency equal to or greater than 100 Hz and 0.012 times the rated voltage peak-to-peak.

The RTU shall have adequate protection against reversed polarity, over current and under voltage conditions, to prevent the RTU internal logic from being damaged and becoming unstable causing mal-operation.

## 1.20 Environmental Requirements

The RTU will be installed in control room buildings with no temperature or humidity control. The RTUs shall be capable of operating in ambient temperature from -5 to +55 degree C with rate of temperature change of 20 degree C/hour and relative humidity less than 95%, non-condensing. At some locations, environmental temperature may go below –5 degree C for which the contractor shall take suitable measures for successfuloperation of RTU.

## 1.21 Noise level

RTU shall be solid state and acoustically quiet. The audible noise generated by the RTU equipment shall not exceed 50 dbA one meter from the enclosure.

## 1.22 RTU Size and Expandability

The software and the database shall be sized to accommodate growth within the ultimate sizing parameters as defined in this specification for the RTU without requiring software or database structure regeneration.

The point counts for the RTUs have been defined in the **Appendix A**. The RTU shall have additional wired available reserve capacity of twenty percent (20%) for each type of points defined in the BOQ. This reserve capacity shall be used without any additional hardware such as I/O cards and terminal blocks.

The RTUs delivered shall have the capability to accommodate additional I/O modules to expand the overall point count of the RTU by a minimum of fifty percent (50%) i.e. 80% more than the actual RTU count defined in the BOQ. The I/O modules here means Status Input module, Analog input module and the Control output module. Other modules, such as processor module, racks etc. as required to meet the overall expandability requirement defined above shall also be supplied by the contractor.

## 1.23 RTU and SIC panels

The Contractor shall provide RTU & System Interface Cabinet (SIC) panels. The SIC shall primarily house all MFMs, interposing control relays and interface terminal blocks. Generally, CMRs and MFMs shall be installed in the Customer Control/Relay panels and all other equipments like Heavy Duty Relays etc shall be housed in the RTU panel. However where it would not be possible to mount the MFMs in the existing customer panel SIC panel shall be provided.
The SIC shall be mounted adjacent to the RTU panel. However, in a few cases, the SIC may be mounted separately at a different locations. All RTU signals shall be connected to the MFMs, interposing relays, and field signals in the interface cabinet. The panels shall meet the following requirements:

(a) Shall be free-standing, floor mounted and height shall not exceed 2100 mm.

(b) Shall have maintenance access to the hardware and wiring through lock-able full height doors.

(c) Shall have the provisions for bottom cable entry

(d) The safety ground shall be isolated from the signal ground and shall be connected to the ground network. Safety ground shall be a copper bus bar. The contractor shall connect the panel's safety ground of to the Employer's grounding network. Signal ground shall be connected to the communication equipment signal ground.

(e) All panels shall be supplied with 230 Vac, 50 Hz, single-phase switch and 15/5A duplex socket arrangement for maintenance.

(f) All panels shall be provided with an internal maintenance lamp, space heaters and gaskets.

(g) All panels shall be indoor, dust-proof with rodent protection, and meet IP41 class of protection.

(h) There shall be no sharp corners or edges. All edges shall be rounded to prevent injury.

(i) Document Holder shall be provided inside the cabinet to keep test report, drawing, maintenance register etc.

(j) All materials used in the enclosures including cable insulation or sheathing, wire troughs, terminal blocks, and enclosure trim shall be made of flame retardant material and shall not produce toxic gasses under fire conditions.

(k) The structural frame of the panels shall be of cold rolled sheet steel of thickness not less than 3 mm for the weight bearing members of the panels such as base frame, front sheet & door frames and 2mm for sides, door, top and bottom portions.

(l) All sheet steel work shall be degreased, pickled, phosphated in accordance with IS6005. The phosphate coating shall be sealed with application of two coats of ready mixed, stoving type zinc chromate primer. Two coats of synthetic enamel paint RAL7032 shade) shall be applied both in the exterior and the interior of the panel.

## 1.24 Interconnections

All cabling between component units of the RTU, RTU to interface cabinet, RTU to MFMs and to the Employer control and relay panels (located in the substation control room) shall be supplied and installed by the Contractor and shall be shown on Contractor supplied drawings. Plug-type connectors with captive fasteners or compression type connectors shall be used for all internal interconnections. The connectors shall be polarized to prevent improper assembly. Each end of intercon-nection cables shall be identified by a marker which includes the cable number and the identifying number and location of each of the cable's terminations. This information shall match with the Contractor's drawings.

Adequate space and hardware shall be provided for routing of the field wiring within the enclosures. Contractor wiring within enclosures shall be neatly arranged and shall not be directly fastened to the enclosure frame. All internal interconnection wiring and cables shall be routed separately from field wiring to the RTU terminals & power wiring. All wiring shall use copper conductors and have flame retardant insulation. Conductors in multi-conductor cables shall be individually colour coded.

The use of non-flammable, self-extinguishing, plastic wire troughs is permissible. Metal clamps must have insulating inserts between the clamps and the wiring. Wiring between stationary and movable components, such as wiring across door hinges or to components mounted on extension slides, shall allow for full movement of the component without binding or chafing of the wiring.

## 1.25 Wiring/Cabling requirements

Shielded (screened) cables shall be used for external Cabling from the RTU/ SIC panels. These external cables (except communication cables) shall have the followingcharacteristics:

a) All cables shall have stranded copper conductor.

b) Minimum core cross-section of 2.5 $mm^2$ for PT cables, 4/2,5 $mm^2$ for CT cables or as per site requirements and 2.5 $mm^2$ for Power & Control outputs and 1.5$mm^2$ for Digital Status inputs, transducer mA current output

c) Rated voltage Uo/U of 0.6/1.1KV

d) External sheathing of cable shall have oxygen index not less than 29 & temperature index not less than 250. Cable sheath shall meet fire resistance test as per IS 1554 Part- I.

e) Shielding, longitudinally laid with overlap.

f) Dielectric withstand 2.5 kV at 50 Hz for 5 minutes

g) External marking with manufacture's name, type, core quantity, cross-section, and year of manufacture.

h) The Communication cable shall be of shielded, twisted pairs and of minimum 0.22sq mm size

## 1.26 Terminal Blocks

Terminal blocks shall be having provision for disconnection (isolation), with full-depth insulating barriers made from moulded self-extinguishing material. Terminal blocks shall be appropriately sized and rated for the electrical capacity of the circuit and wire used. No more than two wires shall be connected to any terminal. Each analog
input signal, digital status input and digital output signals shall require two terminals per point plus a common shield termination for each cable.

All terminal blocks shall be suitably arranged for easy identification of its usages such as CT circuits, PT circuits, analog inputs, status inputs, control outputs, auxiliary power supply circuits, communication signals etc.

Terminal Blocks for CT circuits shall have feature for CT shorting (on CT side) & disconnection (from load side) to facilitate testing by current injection. Similarly, TBs for PT circuit shall have feature for disconnection to facilitate voltage injection for testing.

## 1.27 RTU Architecture

Bidder has the option to offer RTUs having following architectural design:

a) Centralized RTU design where all I/O modules are housed in RTU panels and communicating with master station through communication port.

b) Distributed RTU design where I/O modules are housed in respective bay C&R panels. All these distributed I/O modules shall be connected to a central processor for further communication with master station. The bidder shall asses the requirement of RTU/SIC panels for such design and supply panels accordingly.

## 1.28 RTU Security Process

a) Web access shall be secured on https.

b) Role Based Access Control permissions shall be provided.

c) Services shall be encrypted using SSL.

d) Open ports access shall be restricted to specific IP Addresses.

e) Rate Limiting against DOS (Denial of Service) shall be supported.

## Transducer & Weather Sensor Requirements

All transducers shall use a 48 VDC auxiliary power supply as provided for the RTU. All transducers shall have a maximum power consumption of 10 watts.

## 1.29.1 Transducer Protection

The input, output and auxiliary circuits shall be isolated from each other and earth ground. The transducer output shall be ungrounded and shall have short circuit and open circuit protection. The transducers shall comply to the following requirements, in addition to the requirement of IEC 60688, without damage to the transducer:

i) Electromagnetic Compatibility: IEC 61000-4-3, Level 1

ii) Electromagnetic Compatibility: IEC 61000-4-4, Level 1

iii) Shock Resistance: Minimum severity 50 A, IEC 68-2-27 requirements

iv) Vibration Strength: Minimum severity 55/05, IEC 68-2-6 requirements.

v) Input Circuit Consumption: Less than 0.5 VA for voltage and current circuits.

### 1.29.2 Multi-Function Transducers (MFMs)

The contractor shall provide the multi-function transducers for acquiring the real time analog inputs through 3 phase 4 wire CT/PTs circuits. The multi-function transducer shall be designed for nominal 110 V (Ph-Ph voltage) and 1A/5A (per phase current).
The MFM shall be suitable for 20% continuous over load and shall be able to withstanding 20 times the normal current rating for a period one second. The MFM shall be able to accept the input voltages up to 120% of the nominal voltage. The MFMs shall have low VA burden. These MFMs shall be mounted in the interface cabinet to be supplied by the contractor.

Mutli function transducers shall provide at least the following parameters as a minimum with the specified accuracies.

| **Sl. No.** | **Parameters** | **Accuracy** |
|---|---|---|
| (i) | Voltage | ±0.5% |
| (ii) | Current | ±0.5% |
| (iii) | Frequency | ± 0.2% |
| (iv) | Active Power/Reactive power | ±0.5% / ±1% |
| (v) | Import & Export Energy (active/reactive) | ±1% / ± 2% |
| (vi) | Power Factor (measuring range shall be 0.6 to 1.0 lag & lead) | |

The parameters to be acquired from multifunction transducers shall be selectable. MFM shall provide the 15 minute values (configurable 15 minute/1 hour) of Active Energy Import, Active Energy Export, Reactive Energy Import and Reactive Energy Export.

Multi-function transducers shall accept nominal 48 V DC (positive earthed) as auxiliary power supply. Multi-function transducer shall be provided with RS485 interface to communicate with RTU over Modbus protocol in multi-drop mode.

The MFMs shall be suitable for mounting on DIN rails. The MFM terminals shall accept upto two 2.5 $mm^2$ / 4 $mm^2$ for PT/CT circuit terminations as applicable.

The Multi-function transducer shall have a local display to show all the parameters. The parameters being displayed shall be selected through a push button. The Multi-function transducer shall comply to the EMI/EMC level test requirements as specified for the RTU except for Fast transient burst test requirement which shall be for level 4. The test reports shall be submitted during detailed engineering.

### 1.29.3 Transformer Tap Position Transducer

The existing transformer tap position indications are of two types.

(i) Variable resistance type

(ii) Lamp type

The Contractor shall provide suitable resistance tap position transducers which shall have the following characteristics

(a) The input measuring ranges shall be from 2 to 1000 ohms per step, which is tunable at site with at least 25 steps.

(b) Dual output signal of 4 to 20 mA DC, 0.5% accuracy class as per IEC 688 shall be provided. One output will be used for driving a local digital indicator (to be provided by the contractor) and the other will be used for interfacing with the RTU.

(c) In case of lamp type, additional resistance/potentiometer unit shall be provided to convert the dry type contacts to a variable resistance as defined in (a) above, suitable for the remote indication.

## 1.29.4 Weather Sensors

All weather sensors shall be maintenance free and of Industry standard design. The design of sensors shall permit calibration on site. The sensing mechanism shall be rugged enough to avoid frequent recalibration.

The sensor, support structure shall have built-in protection against lightning stroke/electrical surges.

The output of all the sensors except rainfall sensor shall be 4 to 20 mA at 0-500 ohm impedance.

The output of rainfall sensor shall be in the form of potential free contact and it's closure shall be accumulated (over a configurable time period) and reported at master station through RTU. The sensors shall be located in open and in the electrical environment such as 400 KV EHV outdoor stations. The equipment offered should be suitable for satisfactory operation in above environment.

### *1.29.4.1 Air Temperature Sensor*

| | |
|---|---|
| Sensor | Air Temperature Sensor |
| Output | As per specification 1.29.4 |
| Temperature Range | $-5\ ^{o}$ C to $+\ 60\ ^{o}$ C |
| Resolution | $0.1\ ^{o}$ C |
| Accuracy | $\leq 0.5\ ^{o}$ C or better |
| Radiation Shield | Radiation Shield made of weather resistant Material and suitable to sensor used. |

### *1.29.4.2 Relative Humidity Sensor*

| | |
|---|---|
| Sensor | Relative Humidity Sensor |
| Output | As per specification 1.28.4 |
| Range | 0 to 99 % |
| Resolution | 1% |
| Accuracy | 3 % or better |
| Radiation Shield | Radiation Shield made of weather resistant material and suitable to sensor used. |

| | |
|---|---|
| Operating Temperature Range | -5 $^{o}$ C to + 60 $^{o}$ C |

**Note:** The Air Temperature and Relative Humidity sensors may be supplied in a singleenclosure or separately.

### *1.29.4.3 Rainfall Sensor*

| | |
|---|---|
| Sensor | Tipping Bucket Rain Gauge |
| Output | As per specification 1.29.4 |
| Capacity / Range | Unlimited |
| Resolution | 0.2 mm per tip or better |
| Accuracy | 4% |
| Collecting Area | Minimum 200 sq.mm |
| Operating Temperature | -5 $^{o}$ C to + 60 $^{o}$ C |

### *1.29.4.4 Wind Speed Sensor*

| | |
|---|---|
| Sensor | Anemometer 3 cup assembly, very robust to Withstand strong wind gust. |
| Output | 4 to 20 mA at 0-500 ohm impedance or RS 485 with MODBUS protocol |
| Starting Threshold | 0.5 m/s or better |
| Range | 0.9 - 60 m/s |
| Resolution | 0.1 m/s |
| Accuracy | 2 % or better |
| Mechanical | 3 Cup assembly and housing (complete), should be very robust and capable to withstand strong wind gust and made up of suitable non-rusting material |
| Mounting Accessories | Made of suitable good quality material like steel or high strength fibre. |
| Operating Temperature | $0^{o}$C to + $60^{o}$C ( -$5^{o}$C to + $55^{o}$C for project area with snowfall history) |

**Note:** The Wind Speed and Wind Direction sensors may be supplied in single enclosure or separately.

### *1.29.4.5 Wind Direction Sensor*

| | |
|---|---|
| Sensor | Wind Direction sensor |
| Output | 4 to 20 mA at 0-500 ohm impedance or RS 485 with MODBUS protocol |
| Starting Threshold | 0.5 m/s or better |
| Range | 0 – 360o (Degrees) |
| Resolution | 1o (Degree) |
| Accuracy | 3o (Degrees) or better |
| Construction of | Housing (complete) should be very robust and |

| | |
|---|---|
| Housing and vane | capable to withstand strong wind gust and made up of suitable-non-rusting material having high mechanical strength. Wind vane and control head may be of Aluminum or other light UV resistant material |
| Operating Temperature | 0oC to + 60oC (-5oC to + 55oC for project area with snowfall history) |

### *1.29.4.6 Air Temperature Sensor*

| | |
|---|---|
| Sensor | Air Temperature Sensor |
| Output | 4 to 20 mA at 0-500 ohm impedance or RS 485 with MODBUS protocol |
| Temperature Range | 0°C to + 60°C ( -5°C to + 55°C for project area with snowfall history) |
| Resolution | 0.1°C |
| Accuracy | < 0.5°C or better |
| Radiation Shield | Radiation Shield made of weather resistant material and suitable to sensor used. |

### *1.29.4.7 Weather Sensor Installation Requirement*

The weather sensor shall be supplied along with necessary accessories (e.g. tripod, stand, clamps etc.) for installation/ fixing of sensors, signal/power cables etc. as part of weather sensors station. All the accessories shall be made of stainless steel or other suitable material having sufficient mechanical strength and corrosion resistance to withstand atmospheric temperature, pressure, wind speed and relative humidity up to the working range(Minimum to Maximum) of sensors for these parameters as defined.

The Employer will prefer to install the sensors on roof top of control centre/substation or other building. The mounting arrangement for all the sensors shall be designed suitably for installation on the roof top.

## 1.30 Portable Configuration and Maintenance Terminal (PCMT)

Contractor shall supply a Portable Configuration and maintenance Terminal (Laptop PC) which shall provide followings capabilities:

(a) RTU Data base configuration & Maintenance

(b) Local Operator Interface & RTU Diagnostics

(c) Master Station and RTU simulator cum protocol analyzer

### a) RTU Data base configuration

The **RTU database Configuration** software being supplied with the PCMT shall have the following features

i) Full graphics windows User Interface

ii) Standard editing capabilities e.g. cut, paste, copy, sorting etc.

iii) Capable of controlling revisions of various RTU database files and storing multiple versions of databases for all the RTUs.

iv) Capable of uploading database from the RTU and compare that with another version of database stored in the PCMT.

v) Provide standard template for database modeling required for I/O modules, MFMs & IEDs, communication setting.

vi) Provide mapping of the individual data points acquired from one Protocol to another protocol for transmission.

The database configuration software shall use the same terminology for configuration of the various protocol parameters as specified in the communication protocol standard i.e. it shall be possible to define these parameters by the user discreetly. Also it shall be possible to select an ASDU type to be used for transmission of a measurand e.g. measured value to be transmitted as ASDU 9 or ASDU 11.

## b) Local Operator interface and RTU diagnostics

The Local **Operator interface** software shall support operator inquiries to demand current status and data values of various RTU points, or an overall substation snap-shot, or of the status change buffer.

The local operator interface software shall provide the following reports:

i) Status Reports: Display of all substation status indications, of all tele-metered values, and the RTU's status.

ii) Event Report: Display all the stored events in the event buffer of the RTU.

iii) Print Request: Provide user interface for requesting print out of the Reports on the Logger

iv) Maintenance activities: User interface for interacting with the RTU for maintenance activities like diagnostics, database online requests.

The **RTU** shall have inbuilt features for monitoring the healthiness of the RTU modules and detecting the type of error. The **diagnostics software** shall have diagnostics for the RTU's processor(s), memory, I/O ports, and any other functional areas of the RTU. It shall list the errors recorded by the RTU and provide troubleshooting tools for the RTU.

## c) Master station-cum-RTU simulator & protocol analyzer software tool

The Master station and RTU simulator cum Protocol Analyser software shall be used to monitor and test the RTU's operation using the master station communication protocol. It shall have the following features

i) capable of emulating both the master station and the RTU messages in the communication protocols (IEC 60870-5-101, 104 & MODBUS/103). When the Master station and RTU simulator cum Protocol Analyser software has received or transmitted a message, it shall be possible to immediately "turn around" and transmit or receive a response message.

ii) capability of interfacing to digital side of the RTU for the above purpose.

iii) capable of receiving single and repeated messages using the supplied RTU communication protocol. Each received message shall be checked for validity, including the checksum code. The messages shall be displayed in HEX format or in the ‘interpreted form’ as desired by the user . It shall maintain and display error counters so that the number of errors during a period of unattended testing can be accurately determined.

iv) capable of formatting and transmitting, both as one-time and periodic transmissions, any master station-to-RTU command.

v) capable of preparing illegal messages, such as messages having invalid check codes, for transmission.

The Master station and RTU simulator cum Protocol Analyser software shall also be capable of passively monitoring all communication traffic on a channel without inter-fering with channel operation. Channel traffic captured in the active or passive modes of operation shall be displayed. All fields of a message shall be displayed. A pass/fail indication for the security check code shall be included with each code displayed.

## 1.31 Training, Documentations and TESTING

### 1.31.1 TRAINING

The contractor shall provide training to the Employer's personnel. The training program shall be comprehensive and provide for interdisciplinary training on hardware and software. The training program shall be conducted in English. RTU training course shall cover the following:

a) RTU operation including data flow.
b) Troubleshooting, identification and replacement of faulty Modules.
c) Preventive maintenance of the RTU
d) Use of RTU configuration and Maintenance tool
e) All functional and Diagnostic testing of RTU
f) Database modification and configuration of RTU

### 1.31.2 DOCUMENTATION

The Contractor shall submit 3 sets of all the standard and customized RTU documents for review and approval which includes the following:

a) RTU Function design document
b) RTU Hardware description document & all the documents referred therein to meet all the clauses of the specification.
c) RTU Test equipment user documents
d) RTU user guide
e) RTU Operation & Maintenance document
f) RTU Training documentation
g) RTU database document
h) RTU I/O list
i) RTU Test procedures
j) Data Requirement Sheet (DRS) of all items
k) Protocol documentation including implementation profile etc.

l) RTU installation and Layout, GA, BOQ, schematics and internal wiring drawings for each RTU site

m) RTU to C&R panels/ field device cabling details for each RTU site

After approval of all the above documents, the Contractor shall submit three sets as final documents. The site-specific drawings as indicated at item (i) and (j) above shall be submitted in three sets for each site before installation of RTU. In case some modifications/corrections are carried out at site, the contractor shall again submit as built site-specific drawings in three sets after incorporating all such corrections as noticed during commissioning of the RTU.

### 1.31.3RTU/SIC Testing

**(a) Type Testing**

A complete integrated unit shall be type tested to assure full compliance with the functional and technical requirements of the Specification. The testing sample shall include at least one of each type of cards/modules and devices. The list of Type tests to be performed on the RTU/SIC is mentioned in **Table-2**& type test requirements are mentioned in **Table-3**.
The contractor may optionally submit type test reports for all the EMI/EMC tests conducted at accredited laboratory for review & approval by Employer. However, in the event, the type test reports are not meeting the specification requirement, Employer may ask for the type testing of any or all of the above tests as required at no additional cost.

The type test of RTU w.r.t. functional tests shall be carried out in all cases. Contractor shall commence commercial production of RTUs/SICs after successful completion of all type tests and approval from Employer.

Further, type test reports for transducers and relays shall be submitted as per relevant standards. All weather sensors shall be calibrated as per Indian Metrological Department standards and certificate shall be submitted in this regard.

**(b) Routine Testing**

Each complete unit shall undergo routine testing. The list of Routine tests to be performed in the factory is mentioned in **Table-2**.

**(c) Field Tests**

After RTU/SIC panel installation and interface cabling with C&R panels and communication equipment, the Contractor shall carry out the field-testing. The list of field tests is mentioned in **Table-2**.

**(d) Availability Tests**

After field testing, RTU/SIC shall exhibit 98% availability during test period of 500 hours. Availability tests shall be performed along with Master station. The RTU/SIC shall be considered available only when all its functionality and hardware is operational. The non-available period due to external factors such as failure of DC power supply, communication link etc., shall be treated as hold-time & availability test duration shall be extended by such hold time.

## Table-1: Technical Particulars of RTU

| Sr. no. | Item Description | Value | Remarks |
|---|---|---|---|
| 1 | Data transmission rate | 300 to 9600 bps for serial port & 10/100 Mbps for Ethernet port | Configurable |
| 2 | Communication ports | Minimum 9 Ports | • 2 Ethernet port for Connectivity to Master Station on IEC 60870-5-104 and IEDs/Numerical Relays on IEC 61850<br>•Two RS232 ports –for communication. With 2 master stations on 60870-5-101<br><br>•1 Port– for RTU configuration & Maintenance tool<br>•2 port for LDMS<br>•Required Nos ( Min 4 Nos) RS 485 ports for polling MFMs/Energy Meters |
| 3 | Communication protocol with Master stations | IEC 60870-5-101 & 104 | |
| 4 | Communication Protocol with LDMS | IEC 60870-5-101/ 104 | |
| 5 | Communication Protocol with MFMs | MODBUS/103 | |
| 6 | Communication Protocol with IEDs | IEC 61850 | |
| 7 | Status data transfer to Master station | by exception | |
| 8 | Analog data transfer to Master station | Normally Periodic For major change – by exception | |
| 9 | No. of Scan Groups supported | 16 | |
| 10 | Separate Logical Database for each Master Station | | |
| 11 | RTU shall be able to capture contact operations | of 20 ms or more duration. | |

| | | | |
|---|---|---|---|
| 12 | SOE buffer size | At least 1024 events | |
| 13 | Time stamping accuracy for SOE | 1 ms | |
| 14 | Supporting Control of Devices | Two state & OLTC capacitors | |
| 15 | Down loading of RTU database from master station | Supported | |
| 16 | RTU internal clock stability | At least 1 ppm | |
| 17 | Nominal Power supply voltage | 48V DC | |
| 18 | Compliance to cl. 1.29.1 – Transducer Protection | | |

**Table-2: List of Tests on RTU/SIC**

| Test Nos. | DESCRIPTION OF THE TEST | Type test | Routine test | Field test |
|---|---|---|---|---|
| | **FUNCTIONAL TESTS FOR RTU/SIC** | | | |
| 1. | Check for BOQ, Technical details, Construction & Wiring as per RTU/SIC drawings | √ | √ | √ |
| 2. | Check for RTU database & configuration settings | √ | √ | √ |
| 3. | Check the operation of all Analog inputs, Status input & Control output points of RTU/SIC | √ | √ | √ |
| 4. | Check operation of all communication ports of RTU | √ | √ | √ |
| 5. | Check for communication with master stations or master station simulator for RTU | √ | √ | √ |
| 6. | Test for downloading of RTU database from Master station | √ | | |
| 7. | Test for RTU time synchronization from Master | √ | | √ |
| 8. | Test Power Supply Voltage Margin, Ripple Levels and Short Circuit Protection | √ | | |
| 9. | Test for RTU operation with DC power supply voltage variation | √ | | |
| 10. | Check for auto restoration of RTU on DC power recovery after its failure | √ | √ | √ |
| 11. | Test for RTU diagnostic feature | √ | | |
| 12. | Test for RTU SOE feature | √ | | |
| 13. | RTU Analog accuracy test for analog input | √ | | |
| 14. | Transducer accuracy test | √ | √ | |
| 15. | Test for IEC 60870-5 -104, 61850 & Modbus protocol implemented | √ | | |
| 16. | Test for RTU internal Clock stability | √ | | |
| 17. | Test for RTU Noise level measurement | √ | | |
| 18. | Test for Control Security and Safety for Control outputs | √ | | |
| 19. | Other functional tests as per technical specification requirements | √ | | |
| 20. | End to end test (between RTU & Master station) for all I/O points | | | √ |
| | **EMI/EMC IMMUNITY TESTS FOR RTU** | | | |
| 21. | Surge Immunity Test as per IEC 60870-2-1 | √ | | |
| 22. | Electrical Fast Transient Burst Test as per IEC-60870-2-1 | √ | | |
| 23. | Damped Oscillatory Wave Test as per IEC 60870-2-1 | √ | | |
| 24. | Electrostatic Discharge test as per | √ | | |
| 25. | Radiated Electromagnetic Field Test as per IEC 60870-2-1 | √ | | |
| 26. | Damped Oscillatory magnetic Field Test as per IEC-60870-2-1 | √ | | |
| 27. | Power Frequency magnetic Field Test as per IEC-60870-2-1 | √ | | |
| | **INSULATION TEST FOR RTU** | | | |
| 28. | Power frequency voltage withstand Test as per IEC 60870-2-1 | √ | | |
| 29. | 1.2/50 µs Impulse voltage withstand Test as per IEC 60870-2-1 | √ | | |
| 30. | Insulation resistance test | √ | | |
| | **ENVIRONMENTAL TEST FOR RTU** | | | |
| 31. | Dry heat test as per IEC60068-2-2 / 2-3 | √ | | |
| 32. | Damp heat test as per IEC60068-2-78 | √ | | |
| 33. | Cold Test as per IEC60068-2-1 | √ | | |

**Note:** Test levels for above type tests are elaborated in Table 3

**Table-3: RTU Type Test Requirements**

| Test Nos. | Test Name | EUT Status | Test Level | Power Supply Points | | I/O Points | Passing Criteria |
|---|---|---|---|---|---|---|---|
| | | | | CM | DM | CM | |
| 1 | Surge Immunity Test | ON | Level 3 | 2 kV | 1 kV | 2 kV | A |
| 2 | Electrical Fast Transient Burst Test | ON | Level 3 | 2 KV | - | 1 kV | A |
| 3 | Damped Oscillatory Wave Test | ON | Level 3 | 2.5 kV | 1 kV | 2.5 kV | A |
| 4 | Electrostatic Discharge Test | ON | Level 3 | +/- 6 kV in Contact discharge mode or +/- 8 kV in Air discharge mode | | | A |
| 5 | Radiated Electromagnetic Field Test | ON | Level 3 | 10 V/m electric field strength | | | A |
| 6 | Damped Oscillatory Magnetic Field Test | ON | Level 3 | 30 A/m at 1MHz of magnetic field strength | | | A |
| 7 | Power frequency magnetic field | ON | Level 3 | 30 A/m of magnetic field strength (Continuous duration sine wave) | | | A |
| 8 | Power frequency voltage withstand | OFF | - | 1 KVrms for 1 minute | | | No break down or flashover shall occur |
| 9 | 1.2/50µs impulse voltage withstand | OFF | - | 2 kVp | | | No break down or flashover shall occur |
| 11 | Insulation Resistance Test | OFF | - | Measure Insulation resistance using 500 V DC Megger before & after Power Freq& Impulse voltage withstand tests | | | As per manufacturer standard |
| 12 | Dry heat test | ON | - | Continuous operation at $55^0$ C for 16 hrs | | | 0 |
| 13 | Damp heat test | ON | - | at 95% RH and $40^0$ C for 16 hrs | | | 0 |
| 14 | Cold test | ON | - | Continuous operation at $0^0$ C for 96 hrs | | | 0 |

## Note:-

1. EUT - Equipment Under Test
2. CM - Common Mode; DM - Differential mode
3. I/O pints do not include Communication ports
4. Passing Criteria
   0 - no failure: normal performance within the specified limits
   A : minor failure : temporary degradation or loss of function or performance which is self-recoverable
5. Functional test as per the sl. nos. 1-18 of Table-2 shall also be done during type testing.

| BOQ OF MFM,OLTC TRANSDUCERS,CABLES FOR PROVISION OF RTUS AT NEW STATIONS | | | | | | | | | | | | | | (APPENDIX-IA) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sl No | Name of the S/s for RTUs | Total feeders (MFM) | CMR | Nos of OLTC | 2.5²mm single core Cable for PT in Mts | 4²mm single core Cable for CT in Mts | 1.5²mm 10core Cable for Digital input in Mts | 2 pair Screened Data Cable for MFM O/P in Mts. | 2.5²mm 3core Cable for AC Supply in Mts | 2.5²mm 2core Cable for DC Supply in Mts | 1.5²mm 4core Cable for OLTC input in Mts | Nos of ports for interfacing MFM in RTU(@ max 8 MFMs per port) | RTU Type-I | RTU Type-II |
| 1 | 132kV Dhamra | 30 | 106 | 3 | 500 | 1050 | 1200 | 150 | 120 | 120 | 75 | 4 | 1 | |
| 2 | 132kV Udala | 18 | 66 | 2 | 400 | 850 | 900 | 180 | 120 | 120 | 50 | 3 | 1 | |
| 3 | 132/33kV Dhenkikote | 22 | 70 | 3 | 400 | 800 | 1050 | 200 | 120 | 120 | 75 | 3 | 1 | |
| 4 | 132/33kV Betanati | 23 | 66 | 2 | 400 | 805 | 1050 | 180 | 120 | 100 | 50 | 3 | 1 | |
| 5 | 132/33kV Agarpara | 20 | 70 | 2 | 400 | 700 | 1000 | 150 | 120 | 120 | 50 | 3 | 1 | |
| 6 | 132kV Mania | 22 | 70 | 3 | 400 | 770 | 1100 | 185 | 100 | 120 | 75 | 3 | 1 | |
| 7 | 220/132/33kV Pratapsasan | 27 | 98 | 4 | 400 | 945 | 1250 | 150 | 100 | 120 | 100 | 4 | 1 | |
| 8 | 132/33kV CDA Cuttack at Brajabiharipur | 20 | 70 | 3 | 350 | 800 | 1000 | 180 | 100 | 120 | 75 | 3 | 1 | |
| 9 | 132/33kv Tirtole | 20 | 70 | 3 | 300 | 850 | 1000 | 150 | 100 | 120 | 75 | 3 | 1 | |
| 10 | 132/33kV Satasankha | 20 | 70 | 3 | 300 | 800 | 1000 | 180 | 100 | 120 | 75 | 3 | 1 | |
| 11 | 132/33kV Chikiti | 20 | 70 | 3 | 300 | 700 | 1000 | 150 | 100 | 120 | 75 | 3 | 1 | |
| 12 | 220/132/33kV Aska | 33 | 117 | 3 | 560 | 1155 | 1650 | 200 | 100 | 120 | 75 | 5 | | 1 |
| 13 | 220/33kV Baliguda | 20 | 75 | 3 | 400 | 700 | 1000 | 150 | 100 | 120 | 75 | 3 | 1 | |
| 14 | 132/33kV R Udaygiri | 29 | 62 | 2 | 480 | 1015 | 1450 | 120 | 100 | 100 | 50 | 4 | 1 | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 132/33kV Ghens | 22 | 82 | 2 | 440 | 770 | 1100 | 150 | 100 | 120 | 50 | 3 | 1 | |
| 16 | 220/132/33kv Bargarh New | 30 | 122 | 4 | 500 | 1050 | 1500 | 200 | 100 | 120 | 100 | 4 | 1 | |
| 17 | 132/33kV Kantabanji S/s | 19 | 66 | 3 | 380 | 800 | 950 | 100 | 100 | 120 | 75 | 3 | 1 | |
| 18 | 132/33kV Tushra S/s | 23 | 82 | 3 | 460 | 805 | 1150 | 200 | 100 | 120 | 75 | 3 | 1 | |
| 19 | 132/33kV Birmaharajpur S | 20 | 66 | 3 | 400 | 850 | 1000 | 200 | 100 | 120 | 75 | 3 | 1 | |
| 20 | 132/33kV Potangi | 29 | 62 | 3 | 380 | 1015 | 1250 | 220 | 100 | 120 | 75 | 4 | 1 | |
| 21 | 132/33kV Podagada | 20 | 66 | 3 | 300 | 700 | 1000 | 180 | 100 | 120 | 75 | 3 | 1 | |
| 22 | 132/33kV Boriguma | 20 | 82 | 3 | 300 | 700 | 1000 | 150 | 100 | 120 | 75 | 3 | | 1 |
| 23 | 132/33kV Muniguda S/s | 14 | 46 | 3 | 280 | 590 | 700 | 200 | 100 | 100 | 75 | 2 | 1 | |
| 24 | 220/33kV Kashipur | 18 | 71 | 3 | 360 | 850 | 950 | 220 | 120 | 100 | 75 | 3 | 1 | |
| 25 | 220/33kV Kalimela | 19 | 84 | 3 | 380 | 860 | 950 | 200 | 120 | 120 | 75 | 3 | 1 | |
| 26 | 220/132/33kV Jayapatna | 26 | 113 | 4 | 518 | 880 | 1300 | 200 | 130 | 100 | 100 | 4 | 1 | |
| 27 | 132/33kV Maneswar | 20 | 82 | 3 | 400 | 806 | 970 | 220 | 120 | 130 | 75 | 3 | | 1 |
| | **TOTAL** | 604 | 2104 | 79 | 10688 | 22616 | 29470 | 4765 | 2890 | 3150 | 1975 | | **24** | **3** |

**BOQ OF MFM,OLTC TRANSDUCERS,CABLES FOR THE STATIONS AGAINST REPLACEMENT OF OLD RTUS (APPENDIX-IB)**

| Sl No | Name of RTUs | Total feeders (MFM) | Total nos of CMR | Total no of OLTC | 2.5²mm single core Cable for PT in Mts | 4²mm single core Cable for CT in Mts | 1.5²mm 10core Cable for Digital input in Mts | 2 pair Screened Data Cable for MFM O/P in Mts. | 2.5²mm 3core Cable for AC Supplyin Mts | 2.5²mm 2core Cable for DC Supplyin Mts | 1.5²mm 4core Cable for OLTC input in Mts | No of Ports in RTU (@ max 8 MFMs per port) for interfacing MFM | RTU Type-I | RTU Type-II |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 132kV Bargarh | 13 | 56 | 3 | 260 | 455 | 650 | 100 | 100 | 100 | 90 | 2 | 1 | |
| 2 | 132kV Bolangir Old | 17 | 72 | 3 | 340 | 595 | 850 | 150 | 100 | 100 | 90 | 3 | 1 | |
| 3 | 132kV Kesinga | 18 | 76 | 3 | 360 | 630 | 900 | 150 | 100 | 100 | 90 | 3 | 1 | |
| 4 | 220kV Bolangir New | 13 | 57 | 3 | 260 | 455 | 650 | 100 | 100 | 100 | 90 | 2 | 1 | |
| 5 | 220 Kv Narendrapur | 38 | 120 | 6 | 1110 | 1400 | 1710 | 360 | 40 | 400 | 180 | 5 | | 1 |
| 6 | 220 Kv Bhanjanagar | 25 | 100 | 5 | 700 | 900 | 1300 | 275 | 40 | 315 | 150 | 4 | 1 | |
| 7 | 132 Kv Berhampur | 16 | 80 | 3 | 470 | 600 | 550 | 180 | 60 | 220 | 100 | 3 | 1 | |
| 8 | 132 Kv Chatrapur | 23 | 100 | 2 | 680 | 850 | 810 | 250 | 50 | 300 | 80 | 3 | 1 | |
| 9 | Chandaka | 34 | 120 | 7 | 450 | 820 | 1000 | 300 | 50 | 300 | 210 | 5 | | 1 |
| 10 | Mendhasal | 31 | 120 | 5 | 400 | 720 | 1500 | 300 | 50 | 300 | 150 | 4 | 1 | |
| 11 | Sijua | 14 | 95 | 3 | 200 | 340 | 600 | 150 | 50 | 150 | 90 | 2 | 1 | |
| 12 | Khurda | 20 | 100 | 4 | 300 | 480 | 900 | 150 | 50 | 150 | 120 | 3 | 1 | |
| 13 | Puri | 15 | 100 | 3 | 200 | 360 | 600 | 150 | 50 | 150 | 90 | 2 | 1 | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | Nayagarh | 16 | 90 | 3 | 200 | 380 | 500 | 150 | 50 | 150 | 90 | 2 | 1 | |
| 15 | Paradeep | 32 | 120 | 6 | 400 | 860 | 1200 | 250 | 50 | 250 | 180 | 4 | | 1 |
| 16 | Bidanasi | 25 | 120 | 6 | 350 | 620 | 1500 | 250 | 50 | 250 | 180 | 4 | 1 | |
| 17 | ICCL | 6 | 35 | | 100 | 120 | 500 | 50 | 50 | 100 | | 1 | 1 | |
| 18 | Choudwar | 17 | 124 | 3 | 250 | 400 | 600 | 200 | 50 | 200 | 100 | 3 | 1 | |
| 19 | Cuttack | 25 | 100 | 5 | 350 | 600 | 750 | 200 | 50 | 200 | 150 | 4 | 1 | |
| 20 | Jayanagar | 53 | 160 | 6 | 1060 | 3710 | 3050 | 600 | 120 | 470 | 180 | 7 | | 1 |
| 21 | U.Kolab | 8 | 40 | 0 | 160 | 560 | 500 | 100 | 30 | 100 | | 2 | 1 | |
| 22 | IndravatiPH | 16 | 80 | 2 | 320 | 1120 | 1250 | 200 | 50 | 200 | 80 | 2 | 1 | |
| 23 | BalimelapH | 15 | 75 | 0 | 300 | 1050 | 870 | 350 | 10 | 100 | | 2 | 1 | |
| 24 | Sunabeda | 17 | 85 | 3 | 340 | 1190 | 1000 | 100 | 30 | 100 | 90 | 3 | 1 | |
| 25 | Theruvali | 33 | 140 | 6 | 660 | 2310 | 2640 | 380 | 80 | 290 | 180 | 5 | | 1 |
| 26 | Akhisingh | 15 | 70 | 2 | 300 | 1050 | 960 | 270 | 80 | 140 | 80 | 2 | 1 | |
| 27 | 220kV Duburi(O) | 33 | 175 | 5 | 660 | 990 | 912 | 220 | 40 | 100 | 150 | 5 | | 1 |
| 28 | 400kV Duburi(N) | 37 | 160 | 4 | 740 | 1110 | 1705 | 300 | 40 | 100 | 120 | 5 | | 1 |
| 29 | 220kV Bhadrak | 39 | 165 | 6 | 780 | 1170 | 777 | 250 | 40 | 100 | 180 | 5 | | 1 |
| 30 | 220kV Balasore | 43 | 140 | 6 | 860 | 1290 | 1317 | 400 | 60 | 100 | 180 | 6 | | 1 |
| 31 | 132kV Baripada | 20 | 90 | 3 | 400 | 600 | 579 | 150 | 50 | 100 | 100 | 3 | 1 | |
| 32 | 220kV Joda | 39 | 160 | 5 | 780 | 1170 | 2245 | 400 | 20 | 100 | 150 | 5 | | 1 |
| 33 | 132kV Rairangpur | 18 | 95 | 2 | 360 | 540 | 500 | 160 | 30 | 100 | 60 | 3 | 1 | |
| 34 | Meramundali | 46 | 174 | 2 | 1905 | 1840 | 1936 | 610 | 450 | 450 | 60 | 6 | | 1 |
| 35 | Rengali S/Y | 12 | 56 | 2 | 525 | 480 | 517 | 200 | 140 | 140 | 60 | 2 | 1 | |
| 36 | Rengali PH | 16 | 64 | 2 | 595 | 640 | 2189 | 300 | 300 | 300 | 60 | 2 | 1 | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 37 | TTPS | 19 | 84 | 2 | 3331 | 2867 | 3157 | 440 | 475 | 475 | 60 | 3 | | 1 |
| 38 | Chainpal | 21 | 92 | 2 | 945 | 1000 | 650 | 140 | 30 | 115 | 60 | 3 | 1 | |
| 39 | Kamakhyanagar | 14 | 60 | 2 | 665 | 600 | 341 | 110 | 28 | 100 | 60 | 2 | 1 | |
| 40 | 132kV Dhenkanal | 19 | 98 | 3 | 76 | 76 | 678 | 126 | 51 | 150 | 90 | 3 | 1 | |
| 41 | 132kV Boinda | 17 | 17 | 3 | 68 | 68 | 262 | 95 | 35 | 120 | 90 | 2 | 1 | |
| 42 | 132kV Anugul | 18 | 92 | 3 | 72 | 72 | 380 | 96 | 47 | 115 | 90 | 3 | 1 | |
| 43 | Budhipadar | 53 | 160 | 6 | 1060 | 1590 | 2520 | 570 | 80 | 100 | 180 | 7 | | 1 |
| 44 | Katapali | 34 | 160 | 6 | 680 | 1020 | 1106 | 180 | 60 | 100 | 180 | 5 | | 1 |
| 45 | Chipilma | 17 | 82 | 2 | 340 | 510 | 1154 | 180 | 70 | 100 | 80 | 3 | 1 | |
| 46 | BurlaPH | 18 | 90 | 2 | 360 | 540 | 2082 | 150 | 80 | 100 | 80 | 3 | | 1 |
| 47 | IB TPS | 12 | 70 | 3 | 240 | 360 | 346 | 80 | 60 | 100 | 100 | 2 | 1 | |
| 48 | Rajgangpur | 21 | 90 | 3 | 420 | 630 | 670 | 100 | 60 | 100 | 100 | 3 | 1 | |
| 49 | Tarkera | 30 | 90 | 4 | 600 | 900 | 1675 | 300 | 100 | 150 | 118 | 4 | 1 | |
| 50 | Rourkela | 29 | 90 | 6 | 580 | 870 | 1800 | 300 | 54 | 170 | 160 | 4 | 1 | |
| 51 | Barkot | 15 | 84 | 2 | 300 | 450 | 550 | 130 | 60 | 134 | 80 | 2 | 1 | |
| | **G.Total** | 1093 | 5073 | 162 | 27862 | 40208 | 53018 | 10637 | 3810 | 7719 | 5488 | | **36** | **15** |

**Appendix-II**

## SCHEDULE OF QUANTITY AND DELIVERY SCHEDULE.

DETAIL LIST OF TOTAL REQUIREMENT OF POWER & CONTROL CABLE.

| Sl No | Description | UOM | Quantity required | Desired Delivery | Installation & commissioning | Destination |
|---|---|---|---|---|---|---|
| **1** | RTU (Type-I) | Set | 60 | 6 months from the date of issue of PO | Within 3 months from the date of delivery schedule | Any store/site of OPTCL |
| **2** | RTU (Type-II) | Set | 18 | -do- | -do- | -do- |
| **3** | Multi Function Meter | Nos | 1697 | -do- | -do- | -do- |
| **4** | Contact Multiplying Relay | Nos | 7177 | -do- | -do- | -do- |
| **5** | OLTC Tranducers | Nos | 241 | -do- | -do- | -do- |
| **6** | Weather Sensor | Nos | 78 | -do- | -do- | -do- |
| **7** | 2.5 sq mm single core flexible cable for PT | Kms | 38.550 | -do- | -do- | -do- |
| **8** | 4 sq mm single core flexible cable for CT | Kms | 62.824 | -do- | -do- | -do- |
| **9** | 1.5 sq mm 10 core control cable for digital input | Kms | 82.488 | -do- | -do- | -do- |
| **10** | 2 pair 0.5 sq mm screened date cable (1.5 sq mm) for MFM output. | Kms | 15.402 | -do- | -do- | -do- |
| **11** | 2.5 sq mm 3 core control cable for AC supply. | Kms | 6.700 | -do- | -do- | -do- |
| **12** | 2.5 sq mm 2 core control cable for DC supply. | Kms | 10.869 | -do- | -do- | -do- |
| **13** | 1.5 sq mm 4 core control cable for OLTC input. | Kms | 7.463 | -do- | -do- | -do- |

# Volume-II

## TECHNICAL SPECIFICATION FOR

## CONTROL AND POWER CABLES

1. **SCOPE**

This specification covers the testing and performance requirements of power and control cables for installation & commissioning of RTU in OPTCL system.

Control and Power Cables offered shall be only from the approved vendor list of OPTCL. The list of approved vendor list for the said item is placed at Annexure-IV of this specification.

The power and control cables shall conform in all respects to highest standards of engineering, design, workmanship, this specification and the latest revisions of relevant standards at the time of offer and the purchaser shall have the power to reject any work or material, which, in his judgment, is not in full accordance therewith.

**2. STANDARDS**

Except where modified by this specification, the power and control cables shall be designed, manufactured and tested in accordance with the latest editions of the following standards.

| **IEC / ISO** | **Indian Standard** | **Title** |
|---|---|---|
| IEC 811 | IS-18-10810:1982 | Testing cables |
| IEC 502 | IS-7098:1985 (part 2) | LT and 3.3 - 33kVXLPE cables |
| IEC 502 | IS - 1554:1988 (part 1) | PVC Cables .65/1.IkV |
| IEC 227 | IS - 5819 :1970 | Short circuit ratings for PVC cables |
| IEC 228 | 15-8130:1984 | Conductors for insulated cables |
| IEC 502 | IS - 6474: 1984 | XLPE Cables |
| IEC 502 | | Extruded solid dielectric insulated power cables for rated voltages from 1kV to |

| | | |
|---|---|---|
| | | 30kV |
| IEC 540 | IS - 5831: 1984 | Test Methods for insulation and sheaths of electric cables and cords |
| IEC 287 | | Calculation of the continuous current rating of cables. |
| | IS - 3975 : 1979 | Mild steel wires, strips and tapes for armoring of cables |

The Bidder may propose alternative standards, provided it is demonstrated that they give a degree of quality and performance equivalent to or better than the referenced standards. Acceptability of any alternative standard is at the discretion of the purchaser. The Bidder shall furnish a copy of the alternative standard proposed along with his bid. If the alternative standard is in a language other than English, an English translation shall be submitted with the standard. In the case of conflict the order of precedence shall be 1) IEC or ISO Standards, 2) Indian Standards, 3) other alternative standards.

This list is not to be considered exhaustive and reference to a particular standard or recommendation in this Specification does not relieve the Contractor of the necessity of providing the goods complying with other relevant standards or recommendations. All power and control cables to be used in this project shall be of the cross-linked polyethelene (XLPE) or polyvinyl chloride (PVC) insulated with PVC sheathing types.

## 3. 1.1KV POLYVINYL CHLORIDE (PVC) INSULATED CABLES

### 3.1 RATED VOLTAGE AND TEMPERATURE

The rated voltage of the cable shall be l.1 kV and the maximum operating voltage shall not exceed 110% of the rated voltage.
These cables are suitable for use where the combination of ambient temperature and temperature rise due to load results in a conductor temperature shall not exceeding 70°C* under normal operation and 160°C under short circuit conditions.
*See 13.2.4 for heat resisting and general purpose applications.

### 3.2. CABLE DESIGN

3.2.1 **ALL LV Power cable shall be of PVC insulation armoured type.**
The conductors shall be of Flexibility Class 2 as per IS - 8130: 1984.

3.2.2. Cross-Sectional area of reduced Neutral Conductors:

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal cross-sectional area of main conductor (mm2) | 25 | 35 | 50 | 70 | 95 | 120 | 150 | 185 | 240 | 300 | 400 | 500 | 630 |
| Cross-sctional area of reduced neutral conductor ($mm^2$) | 16 | 16 | 25 | 35 | 50 | 70 | 70 | 95 | 120 | 150 | 185 | 240 | 300 |

3.3. Conductor screening not required

3.4. Insulation
The insulation shall be of Polyvinyl Chloride (PVC) compound. The 'General Purpose' **Type A shall be used for the L V Power cables and 'Heat Resisting' Type C for Control cable. Both shall conform to the requirements of IS - 5831: 1984.**

| Type of Insulation | Normal Continuous Operation | Short Circuit Operation |
|---|---|---|
| General Purpose | 70°C | 160°C |
| Heat Resisting | 85°C | 160°C |

The PVC insulation shall be applied by extrusion and the average thickness of insulation shall not be less than the specified nominal value and the maximum value not more than 0.lmm plus 0.1 of nominal and as specified in IS - 1554(part 1): 1988. The insulation shall be applied so that it fits closely on to the conductor and it shall be possible to remove it without damage to the conductor.

3.5. Insulation Screening not required

3.6. Core Identification and Laying Up of Cores
3.5 core cables shall be identified by colouring of the PVC insulation and multi core by numbers as per IS- 1 554 (part 1): 1988
In multi-core cables, the cores shall be laid up together with a suitable lay as recommended in IS - 1554 (Part 1): 1988. The layers shall have successive right and left hand lays with the outermost layer having a right hand lay.

3.7. Inner Sheath
The laid up cores of the 3.5, 4 and multi core cables shall be covered with an inner sheath made of thermoplastic material (PVC) applied by extrusion.
The thickness of the sheath shall conform to IEC 502/IS - 1554: 1988. Single core cables shall have no inner sheath.

3.8. Armouring only the 3.5 core LV cables will be armoured. The armour shall be applied helically in a layer of steel wires over the inner sheath of the cable. The armour shall consist of round or flat steel wires and comply with the requirements of IEC 502/IS - 1554: 1988. The steel wires shall comply with IS - 3975:

3.9. Outer Sheath
An outer sheath of polyvinyl chloride (PVC) shall be applied over the armour wires (where fitted). The sheath shall be embossed at regular intervals as per the Cable Identification clause of this specification and the minimum thickness and properties shall comply with the requirements of IEC 502/IS - 1554: 1988. The outer sheath for cables with general purpose insulation shall be of the type ST1 PVC compound and for cables with heat resisting insulation type ST2 PVC compound conforming to the requirements of IEC 502/IS - 5831: 1984.
The outer serving shall incorporate an effective anti-termite barrier and shall be capable of withstanding a l0kV DC test voltage for five minutes after installation and annually thereafter.
Cables shall be installed as a single four core cable or three single phase cables plus neutral in a close trefoil formation.
Current ratings shall be calculated in accordance with IEC 287 "Calculation of the continuous current rating of cables with 100% load factor".

3.10. Conductor Sizes

3.11. Cable Drum Length
The cable shall be supplied in 500metre lengths.

## 4. CABLE IDENTIFICATION

The manufacturer's and Employer's name or trade mark, the voltage grade, cable designation and year of manufacture shall be indented or embossed along the whole length of the cable. The indentation or embossing shall only done on the outer sheath. The alphanumerical character size shall be not less than 20% of the circumference of the cable and be legible.

The following code shall be used to designate cables:

| Constituent | Code Letter |
|---|---|
| Aluminium conductor | A |
| XLPE insulation | 2X |
| PVC insulation | Y |
| Steel round wire armour | W |
| Non-magnetic round wire armour | Wa |
| Steel strip armour | F |
| Non-magnetic strip armour | Fa |
| Double steel round wire armour | WW |
| Double steel strip armour | FF |
| PVC outer sheath | Y |

Note: No code letter is required for copper conductor

## 5. SAMPLING OF CABLES

### 5.1. Lot

**In any consignment the cables of the same size manufactured under essentially similar conditions of production shall be grouped together to constitute a lot.**

### 5.2. Scale of Sampling

Samples shall be taken and tested from each lot to ascertain the conformity of the lot to specification.

The samples shall be taken at random. In order to achieve random selection the procedure for selection detailed in IS - 4905: 1968 shall be followed.

## 6. NUMBER OF TESTS AND CRITERION FOR CONFORMITY

Suitable lengths of test samples shall be taken from each of the selected drums. These samples shall be subjected to each of the acceptance tests. A test sample shall be classed as defective if it fails any of the acceptance tests. If the number of defective samples is less than or equal to the corresponding number given in 8.3 the lot shall be declared as conforming to the requirements of acceptance test.

## 7. TESTS ON 1.1 KV PVC INSULATED CABLES

### 7.1. Type Tests

Certification of type tests already completed by independent test laboratories shall be presented wiyh the bid for each cable type. These tests shall be carried out in accordance with the requirements of IS -8130: 1984/IEC 502, IS - 5831:1984/IEC 540 and IEC 811 unless otherwise specified.

Type testing of 33kV,l lkV and 1.1 kV cables shall include the following:

| | Test | Requirement Reference | Test Method as a Part of IS-10810/IEC 811 |
|---|---|---|---|
| **(a)** | **Tests on conductor** | | |
| | Annealing test (copper) | IS-8130: 1984/IEC 502 | 1 |
| | Tensile test (aluminium) | IS-8130: 1984/IEC 502 | 2 |
| | Wrapping test (aluminium) | IS-8130: 1984/IEC 502 | 3 |
| | Resistance test | IS-8130: 1984/IEC 502 | 5 |
| **(b)** | **Tests for Armour wires/strips** | IS - 3975: 1979/IEC 502 | 36 - 42 |
| **(c)** | **Tests for thickness of insulation and sheath** | IS-5831:1984/IEC 540 | 6 |
| **(d)** | **Physical tests for Insulation** | | |
| | Tensile strength and elongation at break | IS-5831:1984/IEC 540 | 7 |
| | Ageing in air oven | IS-5831:1984/IEC 540 | 11 |
| | Hot test | IS-5831:1984/IEC 540 | 30 |
| | Shrinkage test | IS-5831:1984/IEC 540 | 12 |
| | Water absorption (gravimetric) | IS-5831:1984/IEC 540 | 33 |
| **(e)** | **Physical tests for outer sheath** | | |
| | Tensile strength and elongation at break | IS-5831: 1984/IEC 540 | 7 |
| | Ageing in air oven | IS-5831: 1984/IEC 540 | 11 |
| | Shrinkage test | IS-5831: 1984/IEC 540 | 12 |
| | Hot deformation | IS-5831: 1984/IEC 540 | 15 |
| | Loss of mass in air oven | IS-5831: 1984/IEC540 | 10 |
| | Heat shock | IS-5831: 1984/IEC540 | 14 |
| | Thermal stability | IS-5831: 1984<br>IEC 540<br>IS-5831: 1984 Appendix B | |
| **(f)** | **Partial discharge test (11 and 33kV only)** | Section 8.2 of this specification | 46 |
| **(g)** | **Bending test (11 and 33kV only)** | Section 8.3 of this specification | 50 |
| **(h)** | **Dielectric power factor test (11 and 33kV only)**<br>As a function of voltage<br>As a function of temperature | Section 8.4 of this specification | 48 |
| **(j)** | **Insulation resistance (volume resistivity) test** | IS-8130: 1984/IEC502 | 43 |
| **(k)** | **Heating cycle test (11 and 33kV only)** | Section 8.5 of this specification | 49 |
| **(1)** | **Impulse withstand test (11 and 33kV only)** | Section 8.6 of this specification | 47 |
| **(m)** | **High voltage test** | Section 8.6 of this specification | 45 |
| **(n)** | **Flammability test** | Section 8.7 of this specification | 53 |

Tests (g), (h), (j), (1) and (m) are only applicable to screened cables.

Notwithstanding the conditions of the above paragraph the following tests on screened 11 and 33kV cables shall be performed successively on the same test sample of completed cable.

1. Partial discharge test

2. Bending test followed by partial discharge test

3. Dielectric power factor as a function of voltage

4. Dielectric power factor as a function of temperature

5. Heating cycle test followed by dielectric power factor as a function of voltage and partial discharge tests

6. Impulse withstand test

7. High voltage test

If a sample fails in test number 7, one more sample shall be taken for this test, preceded by tests 2 and 5

### 7.2. Acceptance Tests

The following shall constitute acceptance tests:

- Tensile test (aluminium)
- Annealing test (copper)
- Wrapping test
- Conductor resistance test
- Test for thickness of insulation and sheath
- Hot set test for insulation*
- Tensile strength and elongation at break test for insulation and outer sheath
- Partial discharge test (for screened cables only)**
- High voltage test
- Insulation resistance (volume resistivity) test.

• XLPE insulation only

** test to be completed on full drum of cable

### 7.3. Routine Tests

Routine tests shall be carried out on all of the cable on a particular order. These tests shall be carried out in accordance with the requirements of IS - 8130: 1984/IEC 502 and IS - 5831:1984/IEC 540 unless otherwise specified.

The following shall constitute routine tests.
- Conductor resistance test
- Partial discharge test (for 1 IkV and 33kV screened cables only)*
- High voltage test

* test to be completed on full drum of cable

### 7.4. Optional Test

Cold impact test for outer sheath (IS - 5831 - 1984), which shall be completed at the discretion of the Project Manager and at the same time as test at low temperature for PVC as stipulated in the section on special tests.

### 7.5. Special tests

Special tests shall be carried out at the Inspecting officer's discretion on a number of cable samples selected by the Inspecting officer from the contract consignment. The test shall be carried out on 10% of the production lengths of a production batch of the same cable type, but at least one production length. Special tests shall be carried out in accordance with the requirements of IEC 502 and IEC 540 unless otherwise specified.

The following special tests shall be included:

- Conductor Examination (IEC-228)
- Check of Dimensions
- 4-Hour High Voltage Test for 11 kV and 33kV Cables only
- Test at low temperature for PVC

## 8. DETAILS OF TESTS

### 8.1. General

Unless otherwise stated, the tests shall be carried out in accordance with the appropriate part of IS -10810/IEC 502: 1994 and the additional requirements as detailed in this specification.

### 8.2. Partial Discharge Test

Partial discharge tests shall only be made on cables insulated with XLPE of rated voltages above 1.9/3.3kV.

For multicore cables, the test shall be carried out on all insulated cores, the voltage being applied between each conductor and the metallic screen.

The magnitude of the partial discharge at a test voltage equal to 1.5Uo shall not exceed 20pC for XLPE and 40pC for PVC, where Uo is the power frequency voltage between the conductor and earth or J metallic screen.

### 8.3. Bending Test

The diameter of the test cylinder shall be 20 (d +D) ± 5% for single core cables and 15 (d+D) ± 5% for multicores, where D is the overall diameter of the completed cable in millimetres and d is the diameter of the conductor. After completing the bending operations, the test samples shall be subjected to partial discharge measurements in accordance with the requirements of this specification.

### 8.4. Dielectric Power Factor Test

13.4.1. Tan δ as a Function of Voltage

For cables of rated voltage 1.1 kV and above

The measured value of tan δ at Uo shall not exceed 0.004 and the increment of tan δ between 0.5 Uo and 2 Uo shall not be more than 0.002.

13.4.2. Tan δ as a Function of Temperature For cables of rated voltage 1.1 kV and above

The measured value of tan 8 shall not exceed 0.004 at ambient temperature and 0.008 at 90°C for XLPE cables.

### 8.5. Heating Cycle Test

The sample which has been subjected to previous tests shall be laid out on the floor of the test room and subjected to heating cycles by passing alternating current through the conductor until the conductor reaches a steady temperature 10°C above the maximum rated temperature of the insulation in normal operation. After the third cycle the sample shall subjected to a dielectric power factor as a function of voltage and partial discharge test.

### 8.6. High Voltage Test

8.6.1. Type/Acceptance Test

The cable shall withstand, without breakdown, at ambient temperature, an ac voltage equal to 3Uo, when applied to the sample between the conductor and screen/armour (and between conductors in the case of unscreened cable). The

voltage shall be gradually increased to the specified value and maintained for a period of 4 hours.
If while testing, interruption occurs during the 4 hour period the test shall be prolonged by the same extent. If the interruption period exceeds 30 minutes the test shall be repeated.

8.6.2. Routine Test
Single core screened cables, shall withstand, without any failure, the test voltages given in this specification for a period of five minutes between the conductor and metallic screen.
Single core unscreened cables shall be immersed in water at room temperature for one hour and the test voltage then applied for 5 minutes between the conductor and water.
Multicore cables with individually screened cores, the test voltage shall be applied for 5 minutes between each conductor and the metallic screen or covering.
Multicore cables without individually screened cores, the test voltage shall be applied for 5 minutes in succession between each insulated conductor and all the other conductors and metallic coverings, if any.

8.6.3. Test Voltages
The power frequency test voltage shall be 2.5 Uo + 2kV for cables at rated voltages, up to and including 3.8/6.6kV, and 2.5 Uo for cables at higher rated voltages.
Values of single phase test voltage for the standard rated voltages are as given in the following table:

| Voltage Grade kV | Test Voltage | |
|---|---|---|
| | Between conductors and screen/armour kV(rms) | Between conductors kV(rms) |
| 0.65/1.1 | 3 | 3 |

If, for three core cables, the voltage test is carried out with a three phase transformer, the test voltage between the phases shall be 1.732 times the values given in the above table.

When a DC voltage is used, the applied voltage shall be 2.4 times the power frequency test voltage. In all instances no breakdown of the insulation shall occur.

### 8.7. Flammability Test

The period for which the cable shall burn after the removal of the flame shall not exceed 60 seconds and the unaffected portion (uncharred) from the lower edge of the top clamp shall be at least 50mm.

## 9. COMPLIANCE WITH SPECIFICATION

The power and control cables shall comply in all respects with the requirements of this specification. However, any minor departure from the provisions of the specification shall be disclosed at the time of bidding in the Non Compliance Schedule in this document.

## 10. COMPLIANCE WITH REGULATIONS

All the equipment shall comply in all respects with the Indian Regulations and Acts in force.
The equipment and connections shall be designed and arranged to minimize the risk of fire and any damage which might be caused in the event of fire.

## 11. QUALITY ASSURANCE, INSPECTION AND TESTING

### 11.1 Quality Plans

The Contractor shall draw up for each section of the work Quality Plans which shall be submitted to the Project Manager for approval at least two weeks prior to the commencement of work on the particular section. Each Quality Plan shall set out the activities in a logical sequence and, unless advised otherwise, shall include the following:

- An outline of the proposed work and programme sequence;
- The structure of the Contractor's organisation for the Contract;
- The duties and responsibilities assigned to staff ensuring quality of work for the Contract;
- Hold and Notification Points;
- Submission of engineering documents required by the specification;
- The inspection of materials and components on receipt;
- Reference to the Contractor's Work Procedures appropriate to each activity;
- Inspection during fabrication/construction;
- Final inspection and test.

**11.2 Inspection and testing**

The OPTCL inspecting officer shall have free entry at all times, while work on the contract is being performed, to all parts of the manufacturer's works which concern the processing of the equipment ordered. The manufacturer shall afford the purchaser without charge, all reasonable facilities to assure that the equipment being furnished is in accordance with this specification.

The equipment shall successfully pass all the type tests, acceptance tests and routine tests referred to in the section on Tests and those listed in the most recent edition of the standards given in this specification.

The purchaser reserves the right to reject an item of equipment if the test results do not comply with the values specified or with the data given in the technical data schedule.

Routine and acceptance tests shall be carried out by the Contractor at no extra charge at the manufacturer's works.

Type Test certificates shall be submitted with the bid for evaluation. The requirement for additional type tests will be at the discretion of the purchaser.

The purchaser may witness routine, acceptance and type tests. In order to facilitate this, the Contractor shall give the Project Manager a minimum of four weeks notice that the material is ready for testing. If the Project Manager does not indicate his intention to participate in the testing, the manufacturer may proceed with the tests and shall furnish the results thereof to the Project Manager.

Full details of the proposed methods of testing, including connection diagrams, shall be submitted to the Project Manager by the Contractor for approval, at least one month before testing.

All costs in connection with the testing, including any necessary re-testing, shall be borne by the Contractor, who shall provide the Project Manager with all the test facilities which the latter may require, free of charge. The Project Manager shall have the right to select the samples for test and shall also have the right to assure that the testing apparatus is correct. Measuring apparatus for routine tests shall be calibrated at the expense of the Contractor at an approved laboratory and shall be approved by the Project Manager.

The Contractor shall be responsible for the proper testing of the materials supplied by sub-contractors to the same extent as if the materials were completed or supplied by the Contractor.

Any cost incurred by the Project Manager in connection with inspection and re-testing as a result of failure of the equipment under test or damage during transport or off-loading shall be to the account of the Contractor.

The Contractor shall submit to the Project Manager five signed copies of the test certificates, giving the results of the tests as required. No materials shall be dispatched until the test certificates have been received by the Project Manager and the Contractor has been informed that they are acceptable.

The test certificates must show the actual values obtained from the tests, in the units used in this specification, and not merely confirm that the requirements have been met.

In the case of components for which specific type tests or routine tests are not given in this specification, the Contractor shall include a list of the tests normally required

for these components. All materials used in the Contract shall withstand and shall be certified to have satisfactorily passed such tests.
No inspection or lack of inspection or passing by the purchaser's Representative of equipment or materials whether supplied by the Contractor or sub-contractor, shall relieve the Contractor from his liability to complete the contract works in accordance with the contract or exonerate him from any of his guarantees.

## 12. PACKING AND SHIPPING

Required type and length of cables as specified in the station-wise details or as amended subsequent to field survey following award of contract shall be securely packed along with the RTU for the destined station and shall be capable of withstanding all normal transportation and handling. Each length of cable shall be durably sealed before shipment to prevent ingress of moisture. The drums, reels or coils shall be lagged or covered with suitable material to provide physical protection for the cable during transit and during storage and handling operations.

Each cable shall preferably carry or be marked with the following information:
- Individual serial number
- Employer's (Purchaser's) name
- Manufacturer's Name
- Year of Manufacture
- Cable Size and Type
- Length of Conductor (metres)

## Schedule of Guaranteed Technical Particulars for Control Cable.
## (To Furnished by the Bidder)

| ITEM NO. | DESCRIPTION | UNITS | BIDDERS OFFER |
|---|---|---|---|
| 1 | Standard to which the cable conforms | IS-1554/IEC 502 | |
| 2 | Catalogue Number | - | |
| 3 | Conductor Material | - | |
| 4 | Conductor strands | Number | |
| 5 | Conductor shape | - | |
| 6 | Conductor cross sectional area | $mm^2$ | |
| 7 | Outer diameter of conductor | mm | |
| 8 | Number of Cores | - | |
| 9. | Reduced neutral conductor cross sectional area. | $mm^2$ | |
| 10. | Insulation Material | - | |
| 11. | Minimum thickness of Insulation | mm | |
| 12. | Nominal thickness of Insulation | mm | |
| 13. | Outer diameter of over insulation | mm | |
| 14. | Nominal thickness of inner sheathing | mm | |
| 15. | Sheath Material | - | |
| 16. | Type of armouring. | - | |
| 17. | Number and diameter/size of armour wires/strips. | No./mm | |
| 18. | Minimum outer sheath thickness | Mm | |
| 19. | Nominal outer sheath thickness | Mm | |
| 20. | Overall diameter of Cables | Mm | |
| 21. | Minimum Bending Radius | Mm | |
| 22. | Cable identification | - | |
| 23. | Rated Voltage per IEC 502/IS-1554 | kV | |

| | | | |
|---|---|---|---|
| 24. | Conductor DC Resistance per Km at $20^0$ C | ohm/km | |
| 25. | Conductor AC resistance per km. at $20^0$ C and 50 Hz. | ohm/km | |
| 26. | Maximum continuous rating of cable in the conditions outlined in clause-4: system conditions. | A | |
| 27. | Minimum insulation resistance per km. at $90^0$ C. | ohm/km | |
| 28. | Maximum permissible continuous conductor temperature. | $^o$C | |
| 29. | Maximum permissible continuous outer sheath temperature. | C | |
| 30. | DC test voltage for 15 mins. After installation. | KV | |
| 31. | Delivery length per drum. | M | |
| | Weight of conductor per km. | Kg/km | |
| 32. | Weight of cable per km. | Kg/km | |
| 33. | | | |
| 34. | Gross weight of full cable drum. | Kg | |
| 35. | Outer diameter of cable drum. | Mm | |
| 36. | Width of cable drum. | Mm | |
| 37. | Maximum permissible cable pulling tension. | Kg | |
| 38. | Maximum permissible cable side wall pressure. | Kg | |
| 39. | Manufacturer's name. | - | |
| 40. | Country of origin. | - | |

# Schedule of Guaranteed Technical Particulars for Power Cable.
# (To be furnished by the Bidder)

The particulars given in this schedule will be binding upon the contractor and must be departed from without the written permission of the General Manager / Competent authority.

| Sl.No. | Description. | |
|---|---|---|
| 1 | System voltage | |
| 2 | Make of cable | |
| 3 | Type of cable. | |
| 4 | IS or other specification to which the cable is manufactured. | |
| 5 | Conductor material and its grade | |
| 6 | i) Number of wires in each conductor in nos.<br>ii) Nominal dia of wire dia each conductor in No. X mm | |
| 7 | No.of cores and nomi8nal cross sectional area of each conductor in No. X sq.mm | |
| 8 | Shape of conductors. | |
| 9 | Core identification. | |
| 10 | Material used for insulation | |
| 11 | Total thickness of insuloation used over each conductor in mm. | |
| 12 | Specific insulation resistance of dielectric ohm-cum. | |
| 13 | Maximum thermal resistivity of dielectric in electric measure (i.e. difference in C between opposite faces of a cm. Cube of the dielectric to transfer 1 Watt of heat). | |
| 14 | Type width and thickness of screen -mm<br>a) Conductor<br>b) Insulation. | |
| 15 | Type of extrusion /cuing process | |
| 16 | Minimum thickness of Inner Sheath | |
| 17 | Material used for Inner Sheath. | |
| 18 | Method of application of Inner Sheath | |
| 19 | Minimum thickness of Outer Sheath in mm | |
| 20 | Material used for Outer Sheath | |
| 21 | Type and size (i.e. Nominal diameter of armour wire) of Armouring in sq.mm. | |
| 22 | Total cross sectional area of Armouring in sq.mm | |
| 23 | Calculated diameter over layuing up cores (calculated as per fictitious method to IS 10462 Part-I) in mm. | |
| 24 | Calculated diameter of cable over inner sheath in mm (calculated as per IS 10462 Part-I) | |
| 25 | Calculated diameter of cable over armouring ( as per fictitious method to IS 10462 Part-I) in mm. | |
| 26 | Approximate overall diameter of ccable in mm. | |
| 27 | Approximate total weight of Aluminium conductor in 1000 mtrs. Length of finished cable in Kgs. | |
| 28 | Max. thermal resistivity of outer sheath in electrical | |

| | | |
|---|---|---|
| | measure (i.e. difference in C between opposite face of cm. Cube of the dielectric to cause transfer of 1 watt of heath). | |
| 29 | Total length of cable for each drum in meters. | |
| | Total weight of each drum length of cable in Kg. | |
| 31 | Total weight of each drum length of cable with drum | |
| 32 | Size of each drum. | |
| 33 | No.of years the design of the cable offered is in service. | |
| 34 | Continuous safe current carrying capacity for following conditions for a single cable-<br>a) Ground temperature<br>b) Thermal resiistivity of soil 120 C cm/w<br>c) Depth of layuing 1070 mm. | |
| 35 | Continuous current rating in air at 40 C. | |
| 36 | Maximum permissible temperature rise of the conductor for continuous capacity. | |
| 37 | 30 | |
| 38 | Insulation resistance- Meg. Ohms. Per 1000 Metres of finished cable at 20 C | |
| 39 | Coductor resistance =-ohmsper 1000 Metres of finished cable at 20 C | |
| 40 | Conductor reactance0 Ohms per 1000 Metres of finished cable at 20C | |
| 41 | Specific inductive capacity Micro-farads per 1000 Metres of finished cable at 20 C | |
| 42 | Impulse level. | |
| 43 | Positive sequence impedance of cable peer 1000 metres in ohms. | |
| 44 | Megative sequence impedance of ccable per 1000 metres in ohms. | |
| 45 | Zero sequence impedance of cable per 1000 metres in ohms. | |
| 46 | Maximum allowable assymetrical fault current to earth for 1 sec. | |
| 47 | Maximum allowable symmetrical short circuit current for a duration of one second. | |

Signature of the_____

**Appendix-II**

## SCHEDULE OF QUANTITY AND DELIVERY SCHEDULE.

DETAIL LIST OF TOTAL REQUIREMENT OF POWER & CONTROL CABLE.

| Sl No | Description | UOM | Quantity required | Desired Delivery | Installation & commissioning | Destination |
|---|---|---|---|---|---|---|
| **1** | RTU (Type-I) | Set | 60 | 6 months from the date of issue of PO | Within 3 months from the date of delivery schedule | Any store/site of OPTCL |
| **2** | RTU (Type-II) | Set | 18 | -do- | | -do- |
| **3** | Multi Function Meter | Nos | 1697 | -do- | | -do- |
| **4** | Contact Multiplying Relay | Nos | 7177 | -do- | | -do- |
| **5** | OLTC Tranducers | Nos | 241 | -do- | | -do- |
| **6** | Weather Sensor | Nos | 78 | -do- | | -do- |
| **7** | 2.5 sq mm single core flexible cable for PT | Kms | 38.550 | -do- | | -do- |
| **8** | 4 sq mm single core flexible cable for CT | Kms | 62.824 | -do- | | -do- |
| **9** | 1.5 sq mm 10 core control cable for digital input | Kms | 82.488 | -do- | | -do- |
| **10** | 2 pair 0.5 sq mm screened date cable (1.5 sq mm) for MFM output. | Kms | 15.402 | -do- | | -do- |
| **11** | 2.5 sq mm 3 core control cable for AC supply. | Kms | 6.700 | -do- | | -do- |
| **12** | 2.5 sq mm 2 core control cable for DC supply. | Kms | 10.869 | -do- | | -do- |
| **13** | 1.5 sq mm 4 core control cable for OLTC input. | Kms | 7.463 | -do- | | -do- |

**---End of the Section---**

# SECTION- V

## TENDER SPECIFICATION
## NO. Sr.G.M.-CPC –e-Tender-Telecom-RTU-46 /2018-19

## SPECIFICATION FOR COMPREHENSIVE AMC OF THE RTU AND LDMS

| Sl | ITEM DESCRIPTION | UNIT | Total Qty. |
|---|---|---|---|
| 1 | AMC charges for RTU Type-1 equipped with all functional cards along with LDMS work station fully loaded with software /application required for local RTU data display at the respective station/Site. | **Set** | 60 |
| 2 | AMC charges for RTU Type-2 equipped with all functional cards along with LDMS work station fully loaded with software /application required for local RTU data display at the respective station/Site. | **Set** | 18 |

**SCOPE OF AMC(Comprehensive) for above equipment.**

(I) **Annual Maintenance Contract (Comprehensive**) for the RTU along with LDMS for a period **of 5 (Five) years** from the date of expiry of the guarantee period shall have following scope:-

**SCOPE OF AMC(Comprehensive) for above equipment.**

(I) **Annual Maintenance Contract (Comprehensive**) for the RTU along with LDMS to be supplied and commissioned at different Grid sub-stations/ Site, for a period **of 5 (Five) years** beyond the Guarantee period and shall have following scope:-

(a) **Preventive Maintenance** [Half yearly (every six months)]: Contractor to Check the equipment properly to ascertain the performance to the satisfaction of OPTCL in every six months. These inspections are to be carried out in presence of OPTCL Engineer and contractor's representative. A report on inspection & testing along with the status of the RTU and LDMS is to be jointly signed for reference and record. In case any defects are noticed during Preventive Maintenance, such defects are to be rectified within 15 days of such inspection. The spare materials/equipment required to rectify the defects are to be supplied by the contractor free of cost to OPTCL. In case contractor fails to perform the Preventive maintenance within the scheduled stipulated time, the purchaser shall recover from the supplier/contractor a penalty for the delay as per the Price reduction clause indicated below (III-B).

(b) **Break down maintenance**: In case any defect is noticed, the Contractor shall be intimated by the owner, and Contractor shall attend the spot within 07 days from the date of intimation (Date of issue of Letter) positively and shall ascertain the defects and shall rectify the same within 15 days from the date of intimation (Date of issue of Letter) to the Contractor. The spare materials/equipment required to rectify such defects are to be supplied by the contractor free of cost to OPTCL In case Contractor fails to rectify the defects within the scheduled time, the purchaser shall recover from the supplier/ Contractor a penalty for the delay as per the price reduction clause indicated below (III-A). The date of intimation to the Contractor regarding the troubles/defects of the item(s) shall be reckoned as the base date for computing the Penalty amount

(II) **TERMS OF PAYMENT**: (For AMC Contract of RTU and LDMS.
The terms of payments under this contract shall be governed as per the following:

1. Your unconditional acceptance of the order.
2. A performance Bank Guarantee as per the proforma enclosed for 10% of the total Maintenance Contract price (for 05 years) , which will remain valid for more than two months from the expiry of the contract period i.e, 62 months from the last date of the guarantee period. Initially, the BG shall remain valid for 18 months and the same to be revalidated from time to time to cover the entire guarantee period.
3. Payment will be made equally at the end of every six months, period starting from the date of contract period as per the details below:

(a) Release of payment for the 1st installment:- The payment of 1st installments of each year are to be paid to you at the end of 6(six) months. All the RTU and LDMS need to be Checked Properly under Preventive Maintenance (PM) to ascertain the performance to the satisfaction of OPTCL in every six months. This inspection is to be carried out in presence of OPTCL Engineer and contractor's representative. A report on inspection & testing along with the status of RTU and LDMS should be jointly signed and furnished to the verifying authority (Concerned Telecommunication Division) for verification and onward transmission to the designated Nodal Officer.

(b) Similarly, the payment of 2nd installments of each year are to be paid to you at the end of 12(Twelve) months, during which the inspection of RTU and LDMS to keep the schemes in a healthy and functional condition, shall be carried out by the contractor, on production of documents as indicated above.

* The payment for other years of AMC shall be as indicated above.
* The Goods and Service Tax shall be payable at applicable rate.
* The statutory deduction of taxes shall be made from bill.

**(III) PERFORMANCE SECURITY:**

A performance Bank Guarantee as per the proforma enclosed for 10% of the total Maintenance Contract price (**for 05 years**) , which will remain valid for more than two months from the expiry of the contract period i.e, 62 months from the last date of the guarantee period. Initially, the BG shall remain valid for 18 months and the same to be re-validated from time to time to cover the entire contract period. You are requested to furnish the Composite Bank Guarantee of required amount in our standard Bank Guarantee format (enclosed herewith) towards Security, Payment and Performance from any Nationalized/ Scheduled Bank on non-judicial stamp paper worth of Rs. 29.00 (Rupees Twenty Nine) only or as applicable as per prevalent rules.

The B.G. shall be furnished to Sr. General Manager, central Procurement Cell, OPTCL Bhubaneswar-751022 within 30(thirty) days from the date of issue of **NOA (Notification of Award) for AMC** and shall remain valid for a period of **18 (Eighteen)** months and the same to be validated from time to time to cover the entire AMC period. Validation of BG shall be made well before expiry of the validity of BG. The said Bank Guarantee should be accompanied by a confirmation letter from the concerned issuing Bank & should have provision for encashment at Bhubaneswar before the B.G. is accepted and all concerned intimated. No interest is payable on the Composite Bank Guarantee.

b. In case of non-fulfillment of contractual obligation, Composite Bank Guarantee shall be en-cashed without intimation to you.

**(IV) PAYING OFFICER:**

For the purpose of this **NOA** of AMC Contract, **DGM, Telecommunication Division, OPTCL**, of the concerned sub-station, shall be the Paying Officer.

**(V) PRICE REDUCTION SCHEDULE:**

(a) In the event of failure on your part to comply with the provisions of the contract regarding attending to the **Break down** of the RTU and LDMS at various grid substations / site, as indicated elsewhere, a penalty @0.5% of the total taxable value for each day of delay, or part thereof, for such delay, subject to upper limit of price reduction of 10% of the total taxable value if delay is within 30 days and up to 20% if delay exceeds one month, will be levied, without prejudice to any other remedies to which OPTCL may also be entitled, under the provisions of the contract/bid specifications.

(b) In the event of failure on your part to comply with the provisions of the contract regarding attending to the Preventive maintenance (PM) of the RTU and LDMS at various grid substations as indicated elsewhere, a price reduction @30% of the total AMC taxable value for the period shall be imposed for that quarter.

**(VI) CONTRACTOR'S RESPONSIBILITY**:

It will be contractor's responsibility to maintain the entire 50Volt RTU and LDMS, as described in the scope of the contract in healthy and functional manner. The repair and replacement work will be completed within 15 days from the registering of the complaints by OPTCL Engineers of the concerned Grid substations or MANAGER/ AGM/DGM/GM of the concerned Division or Circles respectively failing which the Price reduction clause as at clause-V shall be applied. The replacement of equipment will be done by using materials from the stock to be kept under contractors scope. Any equipment/spare removed from the RTU and LDMS location and taken for rectification, will be rectified and returned back to OPTCL at contractor's own risk and expense, within 15 days from the date of such removal. The date of removal will be reckoned as the date of handing over & taking over report jointly signed by OPTCL Engineer of the concerned Grid substations and contractor's representative.

(a) An indemnity bond shall be furnished before receiving materials from OPTCL .

(b) In case the Bidder did not return the materials taken from the RTU and LDMS Equipment then the BG furnished towards the AMC shall be encashed without any intimation to you.

**(VII) NODAL OFFICER:**

A nodal officer shall be appointed by OPTCL, who will monitor the execution of entire maintenance activities within the scope of this contract. You will furnish all the records, reports, receipts etc., to the Nodal Officer, who will forward the documents, after due verification, for initiation of Half yearly payment activities. The name of the Nodal officer shall be intimated during placement of order to the successful contractor.

**(VIII) CONTRACT AGREEMENT:**

Contractor shall prepare and finalize the Contract Document for signing of the formal Contract Agreement with us, as per the proforma to be provided to you, on non-judicial stamp paper of appropriate value within fifteen days from the date of this order.

**(IX) DURATION OF CONTRACT:**

This AMC shall be in force for a period of 05 (Five) Years, beyond the Guarantee period as stipulated in the Specification.

**Information to be furnished by the contractor:**

The following information is to be provided by the contractor for attending to the faulty RTU and LDMS for rectification during the guarantee period.

Persons to be contacted for the service purpose:
Names: (1)
Designation:
Mobile No.
Alternate Mobile No.
E-mail address:
Alternate e-mail address:

Name: (2)
Designation:
Mobile No.
Alternate Mobile No.
E-mail address:
Alternate e-mail address: