NIT No.: TPCODL/P&S/ 1000000156/21-22

Procedure to Participate in Tender

Tender Enquiry No- TPCODL/P&S/1000000156/21-22

Tender Enquiry No.	Work Description	EMD (Rs.)	Tender Fee (Rs.)	Last Date and Time for payment of Tender Fee
TPCODL/P&S/ 1000000099 /21-22	RC for SITC of 24 V DC System	6,57,000/-	5000	06.01.2022; 17:00 Hours

**EMD is exempted for MSMEs registered in the State of Odisha.*
**MSMEs registered in the State of Odisha shall pay tender fee of Rs. 1,000/- including GST.*
For details of MSME norms, please refer "Annexure VII-A**"*
*** Bidders to note that the Last Date and Time for payment of Tender Fee may be read as **06.01.2022; 17:00 Hours instead of 27.12.2021; 17:00 Hours.***

Please note that corresponding details mentioned in this document will supersede any other details mentioned anywhere else in the Tender Document.

Procedure to Participate in Tender.

Following steps to be done before "Last date and time for Payment of Tender Fee" as mentioned above:

1. Eligible and Interested Bidders to submit duly signed and stamped letter on Bidder's letter head indicating
    a. Tender Enquiry number
    b. Name of authorized person
    c. Contact number
    d. E-mail id
    e. Details of submission of Tender Fee
    f. GST Registration No
2. Non-Refundable Tender Fee, as indicated in table above, to be submitted in the form of Direct Deposit in the following bank account and submit the receipt along with a covering letter clearly indicating the Tender Reference/ Enquiry Number –

    Beneficiary Name – TP Central Odisha Distribution Ltd.
    Bank Name – STATE BANK OF INDIA
    Branch Name – IDCO Towers, Bhubaneshwar
    Address – PO- Saheed Nagar, Janapath, Bhubaneswar.
    Branch Code – 7891
    Account No – 10835304915
    IFSC Code – SBIN0007891

E-mail with necessary attachment of 1 and 2 above to be sent to mosam.saxena @tpcentralodisha.com with copy to samarandra.patnaik@tpcentralodisha.com before last date and time for payment of Tender Fee.

Interested bidders to submit Tender Fee and Authorization Letter before Last date and time as indicated above, after which link from TPCODL E-Tender system (Ariba) will be shared for further communication and bid submission.

Please note all future correspondence regarding the tender, bid submission, bid submission date extension, Pre-bid query etc will happen through TPCODL E-Tender system (Ariba). User manual to guide the bidders to submit the bid through E-Tender system (Ariba) is enclosed.

All communication will be done strictly with the bidders who have done the above step to participate in the Tender.

Also it may be strictly noted that once date of “Last date and time for Payment of Tender Participation Fee” is lapsed no Bidder will be sent link from TPCODL E-Tender System (Ariba). Without this link vendor will not be able to participate in the tender. Any last moment request to participate in tender will not be entertained.

Also all future corrigendums to the said tender will be informed on Tender section on website https://www.tpcentralodisha.com.

NIT No.: TPCODL/P&S/ 1000000156/21-22

OPEN TENDER NOTIFICATION

FOR

RC for SITC of 24 V DC System

Tender Enquiry No.: TPCODL/P&S/ 1000000156/21-22

Due Date for Bid Submission: [21.01.2022; 17:00 Hours]

TP Central Odisha Distribution Limited
2nd Floor, IDCO Towers, Janpath, Bhubaneswar – 751022

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1.0 Event Information

1.1. Scope of work

Open Tenders are invited from interested Bidders entering into a firm contract for the following:

S. No.	Description	EMD Amount (Rs.)	Tender Fee (Rs.)
1.	Rate Contract for SITC of 24V DC System	6,57,000/-	5,000/-

Note: Tender Fee is inclusive of GST

**EMD is exempted for MSMEs registered in the State of Odisha.*
**MSMEs registered in the State of Odisha shall pay tender fee of Rs. 1,000/- including GST.*
For details of MSME norms, please refer "Annexure VII-A**"*
*** Bidders to note that the Last Date and Time for payment of Tender Fee may be read as **06.01.2022; 17:00 Hours instead of 27.12.2021; 17:00 Hours.***

1.2. Availability of Tender Documents

Please refer “Procedure to participate in the e-tender”.

1.3. Calendar of Events

(a)	Date of sale/ availability of tender documents from TPCODL Website	From 30.12.2021 onwards
(b)	Date by which Interested and Eligible Bidder to pay Tender Fee and confirm participation as mentioned in “Procedure to Participate in Tender”	06.01.2022; 17:00 Hours
(c)	Last Date of receipt of pre-bid queries, if any	11.01.2022; 17:00 Hours
(c)	Date & Time of Pre-Bid Meeting (if any)	NA due to COVID-19
(d)	Location of Pre-Bid Meeting	NA due to COVID-19
(e)	Last Date of Posting Consolidated replies to all the pre-bid queries as received	15.01.2022;
(f)	Last date and time of receipt of Bids	21.01.2022; 17:00 Hours

Note :- In the event of last date specified for submission of bids and date of opening of bids is declared as a closed holiday for TPCODL’s office, the last date of submission of bids and date of opening of bids will be the day following working day at appointed times.

1.4 Mandatory documents required along with the Bid

1.4.1 EMD of requisite value and validity
1.4.2 Tender Fee of requisite amount

1.4.3 Requisite Documents for compliance to Qualification Criteria mentioned in Clause 1.7.
1.4.4 Drawing, Type Test details along with a sample of each item as specified at Annexure I (as applicable)
1.4.5 Duly signed and stamped 'Schedule of Deviations' as per Annexure III on bidder's letter head.
1.4.6 Duly signed and stamped 'Schedule of Commercial Specifications' as per Annexure IV on bidder's letter head.
1.4.7 Proper authorization letter/ Power of Attorney to sign the tender on the behalf of bidder.
1.4.8 Copy of PAN, GST, PF and ESI Registration (In case any of these documents is not available with the bidder, same to be explicitly mentioned in the 'Schedule of Deviations')

Please note that in absence of any of the above documents, the bid submitted by a bidder shall be liable for rejection.

1.5. Deviation from Tender

Normally, the deviations to tender terms are not admissible and the bids with deviation are liable for rejection. Hence, the bidders are advised to refrain from taking any deviations on this Tender. Still in case of any deviations, all such deviations shall be set out by the Bidders, clause by clause in the 'Annexure III - Schedule of Deviations' and same shall be submitted as a part of the Technical Bid.

1.6. Right of Acceptance/Rejection

Bids are liable for rejection in absence of following documents:-

i. EMD of requisite value and validity
ii. Tender fee of requisite value
iii. Price Bid as per the Price Schedule mentioned in Annexure I (BOQ)
iv. Necessary documents against compliance to Qualification Requirements mentioned at Clause 1.7 of this Tender Document
v. Filled in Schedule of Deviations as per Annexure III
vi. Filled in Schedule of Commercial Specifications as per Annexure IV
vii. Receipt of Bid within the due date and time

TPCODL reserves the right to accept/reject any or all the bids without assigning any reason thereof.

1.7 Qualification Requirement / Eligibility Criteria

1. The bidder should be a firm registered/incorporated under Companies Act, 1956 or Companies Act, 2013, and further amendment (s)
(Photocopy of Certificate of Incorporation issued by the Registrar of Companies)
OR
a registered partnership firm (registered under section 59 of the Partnership Act, 1932),
(Photocopy of registered Partnership Deed)
OR
a limited liability partnership (under the Limited Liability Partnership Act, 2002),
(Photocopy of the LLP Registration Certificate issued by Registrar of Companies)
OR
a Proprietorship firm.
("Photocopy of Certificate/license issued by municipal authorities under Shop & Establishment Act. Or

Complete ITR (including computation of income) in the name of Proprietor. Or Relevant documents issued by Central/State Government authority/department etc.)

2. The bidder should have demonstrable experience, from among either of the following, of having successfully executed similar works during last Three (03) years ending on the last day of the month previous to the one in which the Tender is issued, i.e.,
a.) Three similar completed works, each valued not less than Rs. 1.53 Crores
OR
b) Two similar completed works, each valued not less than Rs. 2.30 Crores
OR
c) One similar completed work valued not less than Rs. 4.60 Crores.

Relevant documentary proof – Copy of Purchase Order/Letter of Award/Contract/Work Order, with proof of completion in the form of Completion Certificate/Payment Advice/Client's Letter regarding release of Security Deposit/CPG on successful completion of Order, etc.

3. Bidder should have service/sales/distribution network/office in the area covered under this tender to ensure minimum response time. Undertaking on company letterhead for the same with details of distribution/sales/service network.

4. In case bidder uses experience of parent organization based out-side India to meet the QR, then bidder shall submit concurrence from the parent organization to support the supply and experience criteria.

5. The bidder should have average annual turnover of Rs. 13.0 Crores in the last three completed financial years. (Copy of Audited balance sheet and Profit and Loss Statement to be submitted).
Duly authorized copy of the audited annual reports is to be submitted by the bidder for the respective year.
In case of Proprietorship Documents to be furnished will be the ITR for the respective year as defined in column (D) of this table along with the financial statements signed by the Proprietor

6. Bidder should not be black-listed by any Central / State
Government / Public Sector Undertaking in India
(Undertaking on company letterhead for the same with details of distribution/sales/service network)

Bidders need to submit the details as per the attached format with RFP and ensure that the documents submitted are clearly marked/bundled in support of above-mentioned qualification criteria. In absence of these reference documents, the bid will not be further evaluated by the Purchaser and/or the Purchaser may not subsequently be made responsive by the Bidder for any correction of the non-conformity.

1.8. Marketing Integrity

We have a fair and competitive marketplace. The rules for bidders are outlined in the General Condition of Contracts. Bidders must agree to these rules prior to participating. In addition to other remedies available, TPCODL reserves the right to exclude a bidder from participating in future markets due to the bidder's violation of any of the rules or obligations contained in the General Condition of Contracts. A bidder who violates the market place rules or engages in behavior that disrupts the fair execution of the marketplace, may result in restriction of a bidder

from further participation in the marketplace for a length of time, depending upon the seriousness of the violation. Examples of violations include, but are not limited to:

- Failure to honor prices submitted to the marketplace
- Breach of terms as published in TENDER/NIT

1.9. Supplier Confidentiality

All information contained in this tender is confidential and shall not be disclosed, published or advertised in any manner without written authorization from TPCODL. This includes all bidding information submitted to TPCODL. All tender documents remain the property of TPCODL and all suppliers are required to return these documents to TPCODL upon request. Suppliers who do not honor these confidentiality provisions will be excluded from participating in future bidding events.

2.0 Evaluation Criteria

- The bids will be evaluated technically on the compliance to tender terms and conditions
- Bidders meeting Qualification Requirement as mentioned in 1.7, shall be evaluated technically. The technical evaluation criteria is outlined in 8.3 – Bid Evaluation Criteria of section on "Project Specifications (Section A)". Bidders meeting minimum Technical Score shall be considered for further evaluation.
- The bids will be evaluated commercially on the overall all-inclusive lowest cost for complete tender BoQ as calculated in Schedule of Items *[Annexure I].* TPCODL however, reserves right to split the order line item wise and/or quantity wise among more than one Bidder. Hence, all bidders are advised to quote their most competitive rates against each line item.
- Bidder has to mandatorily quote against each item of Schedule of Items *[Annexure I].* Failing to do so, TPCODL may reject the bids.

NOTE: *In case a new bidder is not registered with TPCODL, factory inspection and evaluation shall be carried out to ascertain bidder's manufacturing capability and quality procedures. However TPCODL reserves the right to carry out factory inspection and evaluation for any bidder prior to technical qualification.*

In case a bidder is found as Disqualified in the factory evaluation, their bid shall not be evaluated any further and shall be summarily rejected. The decision of TPCODL shall be final and binding on the bidder in this regard.

2.1 Price Variation Clause: The prices shall remain FIRM during the entire contract period.

3.0 Submission of Bid Documents

3.1 Bid Submission

Bidders are requested to submit their offer in line with this Tender document. TPCODL shall respond to the clarification raised by various bidders and the replies will be sent to all participating bidders through TPCODL e-tender system (Ariba).

Bids shall be submitted in 3 (three) parts:

FIRST PART: "EMD" as applicable shall be submitted. The EMD shall be valid for 210 days from the due date of bid submission in the form of BG / Bank Draft / Bankers Pay Order (issued from a Scheduled Bank) online NEFT/ RTGS transfer favoring 'TP Central Odisha Distribution Limited' payable at Bhubaneswar. The EMD has to be strictly in the format as mentioned in General Condition of Contract, failing which it shall not be accepted by TPCODL and the bid as submitted shall be liable for rejection. A separate non-refundable tender fee of stipulated

amount also needs to be transferred online through NEFT/ RTGS in case the tender document is downloaded from our website.

TPCODL Bank Details for transferring Tender Fee and EMD is as below:

Account Name: TP CENTRAL ODISHA DISTRIBUTION LIMITED
Bank Name: SBI, IDCO Towers, Bhubaneswar
Bank Account No. : 10835304915
IFSC Code: SBIN0007891

For Tender Fee and EMD submitted via online transfer, bidder to ensure that the same are carried out through separate transactions.

The EMD in the form of Bank Draft / BG /Bankers Pay Order shall be delivered at the following address in sealed envelope clearly indicating the tender reference / enquiry number, name of tender and bidder name:

Chief (Procurement & Stores)
TP Central Odisha Distribution Limited
2nd Floor, IDCO Towers, Janpath, Bhubaneswar-751022

SECOND PART: "TECHNICAL BID" shall contain the following documents:

a) Documentary evidence in support of qualifying criteria
b) Technical literature/GTP/Type test report etc. (if applicable)
c) Qualified manpower (if available)
d) Testing facilities (if applicable)
e) No Deviation Certificate as per the Annexure III – Schedule of Deviations
f) Acceptance to Commercial Terms and Conditions viz. Delivery schedule/period, payment terms etc. as per the Annexure IV – Schedule of Commercial Specifications.
g) Quality Assurance Plan/Inspection Test Plan for supply items (if applicable)
h) Project Implementation Plan including Level 2 Schedule for the project
i) Unpriced mentioning "Quoted/Not Quoted" against all line items (Prices should not be mentioned)

The technical bid shall be properly indexed and is to be submitted through TPCODL E-tender platform (Ariba) only. Hard copy of Technical Bids need not be submitted.

The Bid prepared by the Bidder, and all correspondence and documents relating to the Bid exchanged by the Bidder and the TPCODL, shall be written in the English Language. Any printed literature furnished by the Bidder may be written in another Language, provided that this literature is accompanied by an English translation, in which case, for purposes of interpretation of the Bid, the English translation shall govern.

THIRD PART: "PRICE BID" shall contain only the price details and strictly in format as mentioned in Annexure I along with explicit break up of basic prices, Taxes & duties, Freight etc. In case any discrepancy is observed between the item description stated in Schedule of Items mentioned in the tender and the price bid submitted by the bidder, the item description as mentioned in the tender document (to the extent modified through Corrigendum issued if any) shall prevail. Price Bid is to be submitted in soft copy through TPCODL E-Tendering system (Ariba) only. Hard copy of Price Bid not be submitted.

SIGNING OF BID DOCUMENTS:

The bid must contain the name, residence and place of business of the person or persons making the bid and must be signed and sealed by the Bidder with his usual signature. The names of all persons signing should also be typed or printed below the signature.

The Bid being submitted must be signed by a person holding a Power of Attorney authorizing him to do so, certified copies of which shall be enclosed.

The Bid submitted on behalf of companies registered with the Indian Companies Act, for the time being in force, shall be signed by persons duly authorized to submit the Bid on behalf of the Company and shall be accompanied by certified true copies of the resolutions, extracts of Articles of Association, special or general Power of Attorney etc. to show clearly the title, authority and designation of persons signing the Bid on behalf of the Company. Satisfactory evidence of authority of the person signing on behalf of the Bidder shall be furnished with bid.

A bid by a person who affixes to his signature the word 'President', 'Managing Director', 'Secretary', 'Agent' or other designation without disclosing his principal will be rejected.

The Bidder's name stated on the Proposal shall be the exact legal name of the firm.

3.2 Contact Information

Please note all correspondence regarding the tender, bid submission, bid submission date extension, Pre-bid query etc will happen through TPCODL E-Tender system (Ariba).

All communication will be done strictly with the bidder who have done the above step to participate in the Tender.

Communication Details:

Package Owner

Name: Mosam Saxena
Designation: Procurement
Contact No.: 9867983908
E-Mail ID: mosam.saxena@tpcentralodisha.com

Technical Department

Name: Amok Agarwala
Designation: Head – Automation & Technology, Contact No: 9223220845
E-Mail ID : amok.agarwala@tpcentralodisha.com

Escalation Matrix

Name: Mr. Samarendra Patnaik,
Designation: GM-Procurement
Contact No: 7008289603
E-Mail ID: samarendra.patnaik@tpcentralodisha.com

Name: Mr. Pravin Kumar Jain
Designation: Chief (Procurement & Stores)
E-Mail ID: pravin.jain@tpcentralodisha.com

Bidders are strictly advised to communicate with Package Owner through TPCODL E-tender System (Ariba) only. They need to pay Tender Participation Fee to receive the Ariba log-in.

3.3 Bid Prices

Bidders shall quote for the entire Scope of Supply/ work with a break up of prices for individual items and Taxes & duties. The bidder shall complete the appropriate Price Schedules included

herein, stating the Unit Price for each item & total price with taxes, duties & freight up to destination at various sites of TPCODL. The all-inclusive prices offered shall be inclusive of all costs as well as Duties, Taxes and Levies paid or payable during the execution of the supply work, breakup of price constituents.

Applicable GST to be specified clearly.

The quantity break up shown else-where other than Price Schedule is tentative. The bidder shall ascertain himself regarding material required for completeness of the entire work. Any items not indicated in the price schedule but which are required to complete the job as per the Technical Specifications/ Scope of Work/ SLA mentioned in the tender, shall be deemed to be included in prices quoted.

3.4 Bid Currencies

Prices shall be quoted in Indian Rupees Only.

3.5 Period of Validity of Bids

Bids shall remain valid for 180 days from the due date of submission of the bid.

Notwithstanding clause above, the TPCODL may solicit the Bidder's consent to an extension of the Period of Bid Validity. The request and responses thereto shall be made in writing.

3.6 Alternative Bids

Bidders shall submit Bids, which comply with the Bidding documents. Alternative bids will not be considered. The attention of Bidders is drawn to the provisions regarding the rejection of Bids in the terms and conditions, which are not substantially responsive to the requirements of the bidding documents.

3.7 Modifications and Withdrawal of Bids

The bidder is not allowed to modify or withdraw its bid after the Bid's submission. The EMD as submitted along with the bid shall be liable for forfeiture in such event.

3.8 Earnest Money Deposit (EMD)

The bidder shall furnish, as part of its bid, an EMD amounting as specified in the tender. The EMD is required to protect TPCODL against the risk of bidder's conduct which would warrant forfeiture.

The EMD shall be denominated in any of the following form:

- Banker's Cheque/ Demand Draft/ Pay order drawn in favor of TP Central Odisha Distribution Limited payable at Bhubaneswar.
- Online transfer of requisite amount through NEFT/ RTGS.
- Bank Guarantee valid for 210 days after due date of submission.

The EMD shall be forfeited in case:

a) The bidder withdraws its bid during the period of specified bid validity.

Or

b) The successful Bidder does not
   a) accept the Purchase Order, or
   b) furnish the required Performance Security Bank Guarantee

4 Bid Opening & Evaluation process

4.1. Process to be confidential

Information relating to the examination, clarification, evaluation and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process. Any effort by a Bidder to influence the TPCODL's processing of Bids or award decisions may result in rejection of the Bidder's Bid.

4.2. Technical Bid Opening

Bids will be opened at TPCODL Office, Bhubaneswar. All tender bids shall be opened internally by TPCODL. Presence of any bidder will not be allowed during bid opening process. Technical bid must not contain any cost information whatsoever.

First the envelope marked “EMD” will be opened. Bids without EMD/cost of tender (if applicable) of required amount/ validity in prescribed format, shall be rejected.

Next, the technical bid of the bidders who have furnished the requisite EMD will be opened, one by one.

4.3. Preliminary Examination of Bids/Responsiveness

TPCODL will examine the Bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the Bids are generally in order. TPCODL may ask for submission of original documents in order to verify the documents submitted in support of qualification criteria.

Arithmetical errors will be rectified on the following basis: If there is a discrepancy between the unit price and the total price per item that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price per item will be corrected. If there is a discrepancy between the Total Amount and the sum of the total price per item, the sum of the total price per item shall prevail and the Total Amount will be corrected.

Prior to the detailed evaluation, TPCODL will determine the substantial responsiveness of each Bid to the Bidding Documents including production capability and acceptable quality of the Goods offered. A substantially responsive Bid is one, which conforms to all the terms and conditions of the Bidding Documents without material deviation.

Bid determined as not substantially responsive will be rejected by the TPCODL and may not subsequently be made responsive by the Bidder by correction of the non-conformity.

4.4. Techno Commercial Clarifications

Bidders need to ensure that the bids submitted by them are complete in all respects. To assist in the examination, evaluation and comparison of Bids, TPCODL may, at its discretion, ask the Bidder for a clarification on its Bid with respect to the TPCODL specifications and attempt will be made to bring all bids on a common footing. All responses to requests for clarification shall be in writing and no change in the price or substance of the Bid shall be sought, offered or permitted owing to any clarifications sought by TPCODL.

4.5. Price Bid Opening

Price bids will be opened internally without the presence of any bidder representative. The EMD of the bidder withdrawing or substantially altering his offer at any stage after the technical bid opening will be forfeited at the sole discretion of TPCODL without any further correspondence in this regard.

4.6. Reverse Auctions

TPCODL reserves the right to conduct the reverse auction (instead of public opening of price bids) for the products/ services being asked for in the tender. The terms and conditions for

such reverse auction events shall be as per the Acceptance Form attached as Annexure VI of this document. The bidders along with the tender document shall mandatorily submit a duly signed copy of the Acceptance Form attached as Annexure VI as a token of acceptance for the same.

5 Award Decision

TPCODL will award the contract to the successful bidder whose bid has been determined to be the lowest-evaluated responsive bid as per the Evaluation Criterion mentioned at Clause 2.0. The Cost for the said calculation shall be taken as the all-inclusive cost quoted by bidder in Annexure I (Schedule of Items) subject to any corrections required in line with Clause 4.3 above. The decision to place purchase order/LOI solely depends on TPCODL on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that TPCODL may deem relevant.

TPCODL reserves the rights to award contract to one or more bidders so as to meet the delivery requirement or nullify award decision without assigning any reason thereof.

In case any supplier is found unsatisfactory during delivery process, the award will be cancelled and TPCODL reserves right to award contract to other suppliers who are found fit.

6 Order of Preference/Contradiction

In case of contradiction in any part of various documents in tender, following shall prevail in order of preference:

1. Schedule of Items (Annexure I)
2. Post Award Contract Administration (Clause 7.0)
3. Submission of Bid Documents (Clause 3.0)
4. Scope of Work and SLA (Annexure VII)
5. Technical Specifications (Annexure II)
6. Acceptance Form for Participation in Reverse Auction (Annexure VI)
7. General Conditions of Contract (Annexure VIII)

7 Post Award Contract Administration

7.1. Special Conditions of Contract

- After finalization of tender, TPCODL shall place a Rate Contract for a period of Two (02) years to the successful bidder.
- Business Associate (BA) shall submit applicable Performance Bank Guarantee as per GCC within 15 days of issuance of order. PBG applicable shall be 5% of Order Value. PBG submitted, shall be released after completion of applicable guarantee period plus 03 month claim warranty.
- Guarantee applicable shall be as per technical specifications.
- Completion Schedule / Delivery period shall be as per timelines defined in Annexure VII.
- Any change in statutory taxes, duties and levies during the contract period shall be borne by TPCODL.
- All the terms and conditions of TPCODL General Conditions of Contract for Service Orders shall be applicable.

7.2 Drawing Submission and Approval

Refer Annexure II.

7.3 Delivery Timelines

Refer Annexure VII

7.4 Warranty Period

Refer Annexure VII

7.5 Payment Terms

Refer Annexure VII

7.6 Climate Change

Significant quantities of waste are generated during the execution of project and an integrated approach for effective handling, storage, transportation and disposal of the same shall be adopted. This would ensure the minimization of environmental and social impact in order to combat the climate change. Please refer attached Environment Policy and Sustainability Policy, Annexure-XI for more details.

7.7 Ethics

TPCODL is an ethical organization and as a policy TPCODL lays emphasis on ethical practices across its entire domain. Bidder should ensure that they should abide by all the ethical norms and in no form either directly or indirectly be involved in unethical practice.

TPCODL work practices are governed by the Tata Code of Conduct which emphasizes on the following:

- We shall select our suppliers and service providers fairly and transparently.
- We seek to work with suppliers and service providers who can demonstrate that they share similar values. We expect them to adopt ethical standards comparable to our own.
- Our suppliers and service providers shall represent our company only with duly authorized written permission from our company. They are expected to abide by the Code in their interactions with, and on behalf of us, including respecting the confidentiality of information shared with them.
- We shall ensure that any gifts or hospitality received from, or given to, our suppliers or service providers comply with our company's gifts and hospitality policy.
- We respect our obligations on the use of third party intellectual property and data.

Bidder is advised to refer Tata Code of Conduct (TCOC) attached at Annexure X for more information.

Any ethical concerns with respect to this tender can be reported to the following e-mail IDs:

1) Chief Ethics Counselor – Ravindra.singh@tpcentralodisha.com

8 Specification and standards

As per Annexure.

9 General Condition of Contract

Any condition not mentioned above shall be applicable as per GCC attached along with this tender.

10 Safety

All jobs are this tender have to be executed strictly in compliance to the Safety terms and Conditions of TP Central Odisha Distribution Limited. Please refer attached Safety terms and

conditions, Annexure-IX, for details. Violation of Safety norms will result in Penalty as mentioned in the above document.

ANNEXURE I

Schedule for Items

Attached

ANNEXURE II

Technical Specifications

Attached

ANNEXURE III

Schedule of Deviations

Bidders are advised to refrain from taking any deviations on this TENDER. Still in case of any deviations, all such deviations from this tender document shall be set out by the Bidders, Clause by Clause in this schedule and submit the same as a part of the ***Technical Bid.***

Unless specifically mentioned in this schedule, the tender shall be deemed to confirm the* TPCODL*'s specifications:

S. No.	Clause No.	Tender Clause Details	Details of deviation with justifications

By signing this document we hereby withdraw all the deviations whatsoever taken anywhere in this bid document and comply to all the terms and conditions, technical specifications, scope of work etc. as mentioned in the standard document except those as mentioned above.

Seal of the Bidder:

Signature:

Name:

ANNEXURE IV

Schedule of Commercial Specifications

(The bidders shall mandatorily fill in this schedule and enclose it with the offer Part I: Technical Bid. In the absence of all these details, the offer may not be acceptable.)

S. No.	Particulars	Remarks
1.	Prices firm or subject to variation (If variable indicate the price variation clause with the ceiling if applicable)	Firm / Variable
1a.	If variable price variation on clause given	Yes / No
1b.	Ceiling	--------- %
1c.	Inclusive of GST	Yes / No (If Yes, indicate % rate)
1d.	Inclusive of transit insurance	Yes / No
2.	Delivery	Weeks / months
3.	Guarantee clause acceptable	Yes / No
4.	Terms of payment acceptable	Yes / No
5.	Performance Bank Guarantee acceptable	Yes / No
6.	Liquidated damages clause acceptable	Yes / No
7.	Validity (180 days) (From the date of opening of bid)	Yes / No
8.	Inspection during stage of manufacture	Yes / No
9.	Rebate for increased quantity	Yes / No (If Yes, indicate value)
10.	Change in price for reduced quantity	Yes / No (If Yes, indicate value)
11.	Covered under Small Scale and Ancillary Industrial Undertaking Act 1992	Yes / No (If Yes, indicate, SSI Reg'n No.)

Seal of the Bidder:

Signature:

Name:

ANNEXURE V

Checklist of all the documents to be submitted with the Bid

Bidder has to mandatorily fill in the checklist mentioned below:-

S. No.	Documents attached	Yes / No / Not Applicable
1	EMD of required value	
2	Tender Fee as mentioned in this tender	
3	Signed copy of this tender as an unconditional acceptance	
5	Duly filled schedule of commercial specifications (Annexure IV)	
6	Sheet of commercial/technical deviation if any (Annexure III)	
7	Balance sheet for the last completed three financial years; mandatorily enclosing Profit & loss account statement	
8	Acknowledgement for Testing facilities if available (duly mentioned on bidder letter head)	
9	List of Machine/tools with updated calibration certificates if applicable	
10	Details of order copy (duly mentioned on bidder letter head)	
11	Order copies as a proof of quantity executed	
12	Details of Type Tests if applicable (duly mentioned on bidder letter head)	
13	All the relevant Type test certificates as per relevant IS/IEC (CPRI/ERDA/other certified agency) if applicable	
14	Project/supply Completion certificates	
15	Performance certificates	
16	Client Testimonial/Performance Certificates	
17	Credit rating/solvency certificate	
18	Undertaking regarding non blacklisting (On company letter head)	
19	List of trained/untrained Manpower	

Seal of the Bidder:

Signature:

Name

ANNEXURE VI

ACCEPTANCE FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT

(To be signed and stamped by the bidder)

In a bid to make our entire procurement process more fair and transparent, TPCODL intends to use the reverse auctions as an integral part of the entire tendering process. All the bidders who are found as technically qualified based on the tender requirements shall be eligible to participate in the reverse auction event.

The following terms and conditions are deemed as accepted by the bidder on participation in the bid event:

1. TPCODL shall provide the user id and password to the authorized representative of the bidder. *(Authorization Letter in lieu of the same shall be submitted along with the signed and stamped Acceptance Form).*
2. TPCODL will make every effort to make the bid process transparent. However, the award decision by TPCODL would be final and binding on the supplier.
3. The bidder agrees to non-disclosure of trade information regarding the purchase, identity of TPCODL, bid process, bid technology, bid documentation and bid details.
4. The bidder is advised to understand the auto bid process to safeguard themselves against any possibility of non-participation in the auction event.
5. In case of bidding through Internet medium, bidders are further advised to ensure availability of the entire infrastructure as required at their end to participate in the auction event. Inability to bid due to telephone line glitch, internet response issues, software or hardware hangs, power failure or any other reason shall not be the responsibility of TPCODL.
6. In case of intranet medium, TPCODL shall provide the infrastructure to bidders. Further, TPCODL has sole discretion to extend or restart the auction event in case of any glitches in infrastructure observed which has restricted the bidders to submit the bids to ensure fair & transparent competitive bidding. In case of an auction event is restarted, the best bid as already available in the system shall become the start price for the new auction.
7. In case the bidder fails to participate in the auction event due any reason whatsoever, it shall be presumed that the bidder has no further discounts to offer and the initial bid as submitted by the bidder as a part of the tender shall be considered as the bidder's final no regret offer. Any offline price bids received from a bidder in lieu of non-participation in the auction event shall be out-rightly rejected by TPCODL.
8. The bidder shall be prepared with competitive price quotes on the day of the bidding event.
9. The prices as quoted by the bidder during the auction event shall be inclusive of all the applicable taxes, duties and levies and shall be FOR at TPCODL site.
10. The prices submitted by a bidder during the auction event shall be binding on the bidder.
11. No requests for time extension of auction event shall be considered by TPCODL.
12. The original price bids of the bidders shall be reduced on pro-rata basis against each line item based on the final all-inclusive prices offered during conclusion of the auction event for arriving at Contract amount.

Signature & Seal of the Bidder

ANNEXURE VII

Scope of Work & SLA

Attached

ANNEXURE VII-A

Preferential norms for procurement from MSMEs registered in the State of Odisha

1) Tender Fees

To participate in the tender, MSMEs registered in the State of Odisha shall pay Rs.1,000/- including GST towards cost of tender paper.

2) Earnest Money Deposit (EMD)

EMD shall be exempted for MSME registered in the State of Odisha. However, Bidder shall be barred to participate in the tendering process for a period of 2 years in case it backs out post award of the contract.

3) Qualification Requirement for Open Tenders

Qualification Requirement of Financial Turnover for MSME registered in the State of Odisha shall be reduced to 20% of the existing criteria.

For past experience, instead of relying on the volumes / value of earlier Supplies / Projects, assessment of the Bidder shall be done on the basis of feedback from Customers. Past performance experience at Tata Power and its Group Companies shall supersede feedback from other Customers.

4) Reservation for MSME

It shall be mandatory to procure at least 20% of the total volume of the procurement from MSME registered in the State of Odisha (however, it shall not apply where goods/services are not available with the MSME), subject to matching L1 discovered prices and meeting technical specifications including quality requirements.

5) Performance Bank Guarantees

Performance Bank Guarantee for MSME registered in the State of Odisha shall be 25% of the value normally prescribed..

ANNEXURE VIII
GENERAL CONDITIONS OF CONTRACT

Attached: General Conditions of Contract (GCC) for Composite Orders

ANNEXURE IX

SAFETY POLICY AND SAFETY TERMS AND CONDITIONS

1. Objective

The Tata Power engages contractor workforce to execute, run and maintain various operating sites and facilities across locations for various business verticals including Generation, Transmission, Distribution and Renewable. The activities range from project execution, operation, maintenance to facilities management.

The management of contractor safety represents a significant challenge for management. Tata Power has a responsibility to ensure that contractors are provided with enough information and support to enable them to conduct their roles safely and without endangering health and safety of their own workforce or that of our staff.

To ensure reduction in reportable injuries and achieve goal of zero accidents, first edition of contractor safety code of conduct was launched successfully in the year 2014. Since last four years after the launch of CSCC, Tata Power could achieve the objective of reduction in reportable injuries and fatalities.

Over the period, as the system was being matured, a need was felt to make second revision of the CSCC process. Objective of second revision is improve existing CSCC system and make it user friendly.

2. **Scope:** This procedure applies to all operating and project sites of The Tata Power Company Ltd and Group companies including new businesses like EV charging, Home Automation etc.

3. **Definitions**

3.1. **Order Manager:** Order Manager is the Tata Power representative, who has the ownership of the given job.

3.2. **Site Safety Management Plan**: It is the safety plan agreed between Contractor and Tata Power. It will contain the entire job specific safety requirement and will be signed by the contractor.

3.3. **Contractor**: An individual or a company that provides services to Tata Power under a signed contract.

3.4. **Emergency:** a serious, unexpected or dangerous situation requiring immediate action, which may result in loss of revenue/property, business discontinuity. In case of Emergency*, services may be procured by selecting the qualified vendor based on the vendor category without the safety bid evaluation. It must be approved by MB level and above.

3.5. **Expert Service jobs:** Jobs which needs expert services of contractor which does not involve direct exposure to the potential risk or work which involves only supervisory work such as expert for turbine overhaul, expert for boiler overhaul, expert for pump and motor, expert for compressor overhaul.

3.6. **Head of the Division:** Business in charge of the division who is overall custodian of the generating station or transmission division or distribution division.

3.7. **Category A Vendor: Vendor** eligible to carry out Very High & High risk (as per Tata Power Hazard Identification and Risk Analysis Procedure) and /or Long-Term Contract related to operation and maintenance (O&M) of plant. Vendors must fulfil the requirement specified for Category A in Appendix 12-CSMF-5 of this document.

3.8. **Category B Vendor:** Vendors eligible to carry out technical jobs, that are classified under Medium /low risk. Vendors must fulfil the requirement specified for Category B in Appendix 12-CSMF-5 of this document.

3.9. **Category C Vendor:** Vendors eligible for to carry out low or very low risk administrative and office jobs. For this he must fulfil the requirement specified for Category C in Appendix 12-CSMF-5 of this document.

3.10. **Category D Vendor: All** Consultants, Medical Practitioners or vendors taking job from Tata Power and working from their own premises (e.g. motor rewinding at vendor's shop floor, equipment sent for repair to vendor's works etc.) are classified as Category D Vendor

3.11. **High Risk Jobs: A Job or its activities are considered as Very High or High Risk when Order manager apply the "Tata Power Hazard Identification and Risk Analysis" procedure and found safety risk associated with are under Very High or High category. Indicative lists of jobs are given in appendix 15 of this document.**

3.12. **Medium Risk Jobs: Jobs or its activities are considered as medium risk when Order manager apply "Tata Power Hazard Identification and Risk Analysis" procedure and found the same as Medium Risk.**

3.13. **Low Risk Jobs: Any job or its activities are considered as Low or Very low risk while Order manager, calculate it by applying "Tata Power Hazard Identification and Risk Analysis" procedure and found it under Low or Very Low category.**

3.14. Long Duration Jobs: When the duration of job is 12 months or more, it is considered as Long duration job

3.15. High Value Jobs: When the value of the job contract is Rs. One Crore or more it will be considered as High value job**.**

4. Responsibilities

4.1 Order Manager: Order Manager is the Tata Power representative, who is responsible for:

4.1.1 Finalizing the Site Safety Management Plan along with Contractor, Safety Concurrences Group, Divisional Safety Head and Expert (External or Internal) if required.
4.1.2 Supervise and ensure work is carried out as per the Site Safety Management Plan including agreed Risk Assessment (HIRA/JSA) and Method Statement.
4.1.3 Conduct audit and evaluate Safety Performance of contractor.
4.1.4 Ensure contractors adhere to all statutory provisions.
4.1.5 In case any deviation is needed in agreed safety management plan or in CSCC process for execution of job, Management of Change procedure will be applicable, and approval may be obtained from divisional head /Cluster head.

4.2 Contractor: The person, entity or organisation who is executing the job for Tata Power under a contractual agreement and will be responsible for the following

4.2.1 To follow all Tata Power Critical Safety Procedure, Rules and guidelines given in Safety Terms and Conditions
4.2.2 Undertake job as per Site Safety Management Plan CSM-F10 and method statements agreed with Tata Power.
4.2.3 Raise any concerns with regard to their work and its safety with the Tata Power Order Manager.
4.2.4 Report all injuries, near misses, unsafe acts/conditions, and occurrences to the Tata Power Order Manager immediately.
4.2.5 Ensure that all sub-contractors follow the Tata Power Safety Procedure and agreed Site Safety Management Plan CSM-F10.
4.2.6 To follow all statutory requirements as per the laws of the land.
4.2.7 All vendors applying for A category jobs or submitting quote for high risk jobs shall obtain certificates of ISO 9001, ISO14001 and ISO45001 before submitting quote for high risk Jobs.

4.3 Safety Concurrence Group: It is Cross Functional Team constituted by Corporate Safety Team, which will have representatives from Execution department, Divisional safety and Corporate / Divisional contracts. SCG will be responsible for the following

4.3.1 Assessment of Safety Potential of new vendor before registration as per CSM-F1-Safety Category Qualification Form.
4.3.2 Safety Evaluation of the bids as per evaluation format CSM-F-9 Safety Bid Evaluation Criteria
4.3.3 Finalization of the Site Safety Management Plan CSM-F-10 submitted by the contractor.
4.3.4 Corporate Safety Team / Cluster Safety Head will be part of SCG during Safety Bid Evaluation for following types of jobs
4.3.4.1 High-Risk jobs to be carried out in Annual Overhaul / Major Shutdowns and Outages.
4.3.4.2 Capex jobs of High-Risk Category

5.1 Vendor Registration

For Vendor Registration, Corporate Contract will issue following documents for evaluation of contractor's safety capability

1) CSM-F1 –Safety Category Qualification Form
2) Safety Terms and Conditions

The document Safety Terms and Conditions provides the information about Tata Power safety System to the contractor. Contractor will submit the CSM-F1- Safety Category Qualification Form with all relevant details and documents to Vendor Registration Initiator, which will in turn forward it to Safety Concurrence Group (SCG) for evaluation. The SCG will evaluate the details submitted by the contractor based on a predetermined criteria CSM-F-5 Safety Potential Evaluation Criteria for Vendor Registration and will determine the category (Category A/B/C/D) for which the contractor will be registered. As mentioned in the above criteria, a site visit may also be organized by SCG prior to registration under Category A and B. In case, the contractor does not qualify the safety criteria, the contractor will not be registered. However, he may apply afresh for registration after 6 months. Please refer Appendix 1: Process Flow Chart for Vendor Registration.

5.2 Bid evaluation

At the time of placing the Purchase Requisition (PR), Order Manager is required to declare the risk involved in the of the job (i.e. High Risk / Medium Risk / Low Risk jobs, based on the RPN in HIRA. If the Job is "High Risk" or "Long Duration", then RFQ will be attached with following documents:

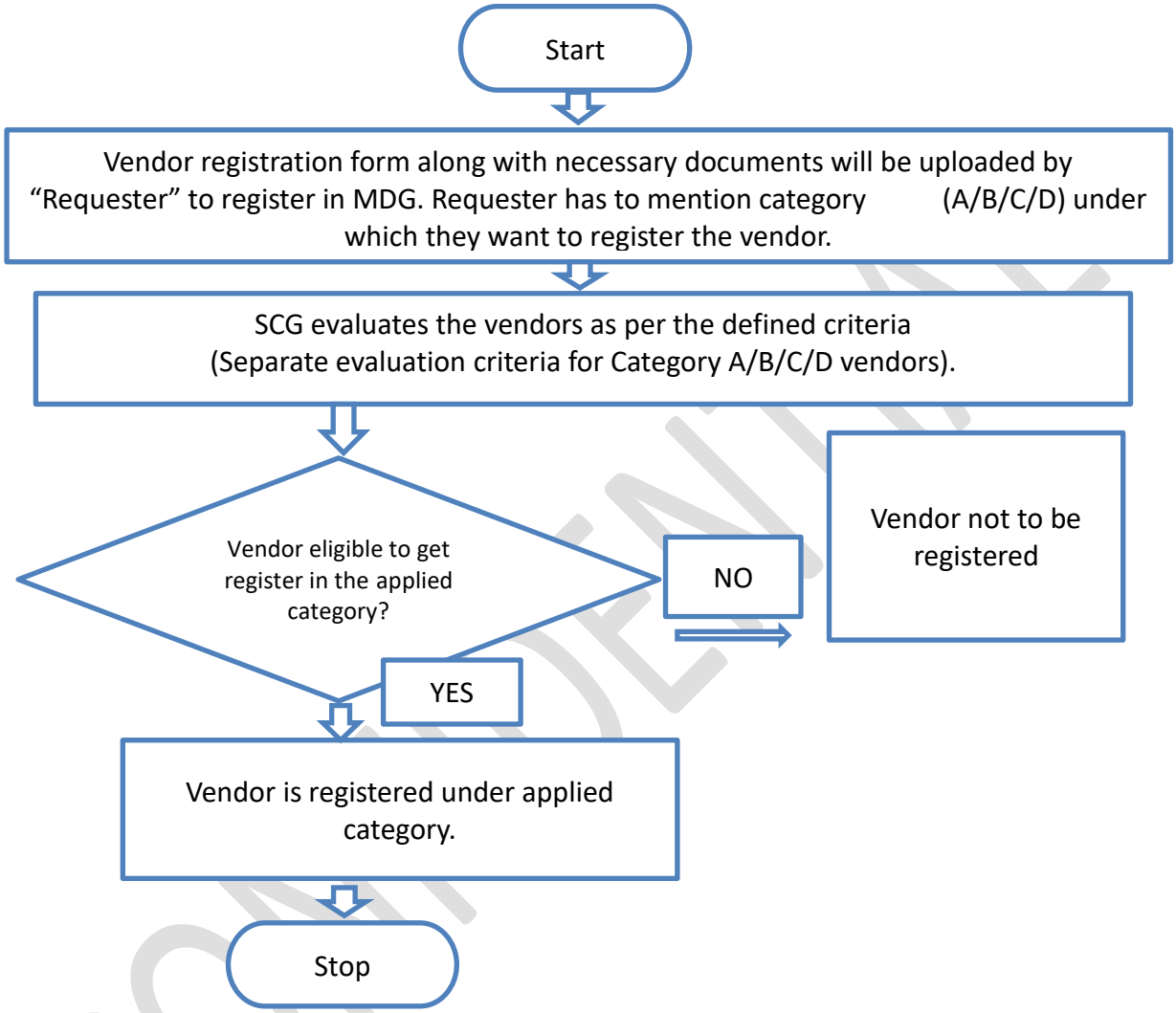
1) CSM-F7- Blank Safety Competency Form
2) CSM-F8 PPE requirements
3) Safety Terms and Conditions
4) Job Specific Safety Requirement (Educational and Professional Qualification, Skill & Experience Manpower, Tools and Tackles (e.g. man lifter, use of drone, use & availability of rescue kit), Work Methodology etc.)

Otherwise the RFQ will be attached only with Safety Terms and Conditions. Long term and low value jobs (see definition) are exempted from the CSCC process.
Corporate Contracts will collect duly filledCSM-F7 Safety Competency Form along with the bid. All other stakeholders will also put their efforts to get all relevant safety data during meeting / discussions with the vendor. SCG will evaluate the document as per the CSM-F9 Safety bid evaluation criteria. If any specific condition related to Contract is required to convey to contractor, Site safety team will attach the same as Annexure for specific conditions of job and submit it to contract team along with safety bid evaluation form. Commercial bid of contractor will be considered for evaluation by contract team only if contractor is qualified in safety bid. Site Safety Management Plan, defining the complete procedure of executing the job at site will be signed by the contractor and SCG after mutual agreement. CC will attach a copy of site safety Management Plan and any specific condition of contract along with PO to the successful bidder. Please refer Appendix 6: Process Flow Chart for issuing RFQ and PO significant health and safety risk associated with it.

5.3 Safety Performance Evaluation

During the time of job execution, regular site inspection will be carried out by the Tata Power officials and violations will be dealt as per CSM–F4 Safety Violation Penalty Criteria. Apart from this, monthly safety performance of the contractor will be evaluated based on the predetermined criteria as per CSM-F11 safety Performance Score and monthly score will be maintained by the Order Manager. Certain percentage of each running bill will be retained as Safety Retention amount and will be released on the basis of Safety Performance Score at certain intervals as defined in CSM- F-3- Safety Performance Evaluation Criteria. Please refer Appendix 10: Process Flow Chart for Safety Performance Evaluation. Percentage of retention amount is mentioned in safety terms and conditions.

Appendix 1: Process Flow Chart for Vendor Registration



Appendix 2: CSM-F-1 Safety Category Qualification form

1. "**Safety Category Qualification Form**" is part of vendor registration form. It needs to be filled by the contractor at the time of Registration and should submitted to Requester / order manager with all relevant documents.
2. The same will be evaluated by Safety Concurrence Group of the Division (SCG) as per the criteria given in CSM-F-5.
3. Information provided by contractor will be verified during site visit.

Safety Category Qualification Form

Please consider my application for

Category A Vendor: Vendor eligible to carry out Very High- and High-risk O&M jobs
Category B Vendor: Vendors eligible to carry out technical jobs, classified as Medium / low ris
Category C Vendor: Vendors eligible for to carry out low or very low risk administrative and office job
Category D vendor: All Consultants, Medical Practitioners or vendors taking job from Tata Power and working from their own premises.

<table>
<tr><td colspan="4">Name of the Vendor:</td></tr>
<tr><td>Sr. No</td><td>Safety Information</td><td>Remarks</td><td>Attachment</td></tr>
<tr><td>1</td><td>Certified for
i. OHSAS 18001/ ISO 45001,
ii. ISO: 14001
iii. ISO: 9001
(ISO certificates to be issued from reputed accreditation agencies specified by Tata Power)</td><td>i. Y/ N
ii. Y/ N
iii. Y/ N</td><td>Attach copy of the certification</td></tr>
<tr><td>2</td><td>Safety Statistics for Last Three (3) Years
- LTIFR
- LTISR</td><td>Yes/No</td><td><table><tr><td></td><td>Year 1 (Last FY)</td><td>Year 2</td><td>Year 3</td></tr><tr><td>LTIFR</td><td></td><td></td><td></td></tr><tr><td>LTISR</td><td></td><td></td><td></td></tr></table></td></tr>
<tr><td>3</td><td>Do you have Safety Policy?</td><td>Yes/No</td><td>Attach copy of the safety policy.</td></tr>
<tr><td>4</td><td>Do you have Safety training process?</td><td>Yes/No</td><td>Attach safety training process.</td></tr>
<tr><td>5</td><td>Do you have Safety organization structure e.g. Safety Officers and Safety Committees?</td><td>Yes/No</td><td>Attach copy of the safety organization structure.</td></tr>
<tr><td>6</td><td>Name and address of sites where work is in progress or worked earlier</td><td>Yes/No</td><td>Site details to be attached for inspection by Officials.</td></tr>
</table>

Signature :
Name and Designation :
Stamp of Organization :

Appendix 3: Safety Terms and Conditions

Please refer the attached document Safety Terms and Conditions.

Appendix 4: CSM- F-3- Safety Performance Evaluation Criteria

1. A certain percentage of the bill value will be retained against every running bill as safety performance retention. The amount will be released with the last invoice or every six-month based on Safety Performance Score of contractors. The retention amount will be calculated based on contract value as below.

Contract Value	Retention Amount (%)
Up to 10 Lakhs	2.5
10 – 50 lakhs	2
0.5 to 10 Cr	1.5
>10 Cr	1

2. The evaluation criteria include Lead Indicators such as CFSA (Contractor Field safety Audit) score, percentage of workers trained in TPSDI, inspection of critical equipment. Lag indicators such as Fatalities, LWDC and man days lost.
3. The retention amount saved will go to a separate Safety Improvement Fund.
4. For the contract value of more than Rs 1 Cr or contract duration more than 12 months, the retention amount shall be released half yearly based on safety performance. For all remaining contracts, the retention amount will be released with the final bill.
5. Long term jobs with low value (Less than Rs. 1 Cr.) are exempted from the safety retention. Invoice of these type of jobs can be cleared without safety retention.
6. In case of job stoppage due to safety violations / unsafe observations at the site, no time extension shall be given to the contractor, if such delays are attributable to contractor.
7. In case of fatality, limb loss or loss of property, vendor must pay for liability, legal, statutory and additional mutually agreed settlement charges imposed by the appointed committee. This charge is over and above the retention amount.
8. The committee will finalize an amount between 5 -50 lakhs based on factors such as advise by statutory authorities, contract value and impact of accident etc.
9. Safety performance bonus 1% (limiting to 50 lakhs) of the invoice value will be considered at the end of the job if the contractual safety performance score 100%.
10. During the progress of the work, concerned Supervisor/Engineer will visit and inspect the work site regularly and evaluate the safety performance of the contractor based on matrix attached herewith and apply the Consequence management policy as applicable.
11. Order Manager, divisional chief and SBU head have the authority to terminate the contract in case of three consecutive serious violations.

Safety Performance Evaluation report- CSM-F-3

	Lead Indicators	**Unit Of measurement**	**Target**	**weight age**
1	% of Employee certified in TPSDI/Authorized agency	%	50%	10
2	CFSA score (Annexure 6.1)	Average Severity of Violations	1.49	20
3	Monthly inspection completed by contractor for Critical Equipment, lifting Tools & Tackles and hand tools used at site as per Tata Power Checklist	%	80	5
4	Revalidation of Condition of tools, tackles and equipment by Order Manger.	%	100	15
	Lag Indicators			
1	Number of Fatalities	No.	0	30
2	Number of Lost workday case (LWDC)	No.	0	10
3	Man-days Lost	No.	0	10

Appendix 5: CSM- F-4 Safety Violation Penalty Criteria

Penalty shall be imposed on the contractors under the following circumstances for breaching the contractual agreements:

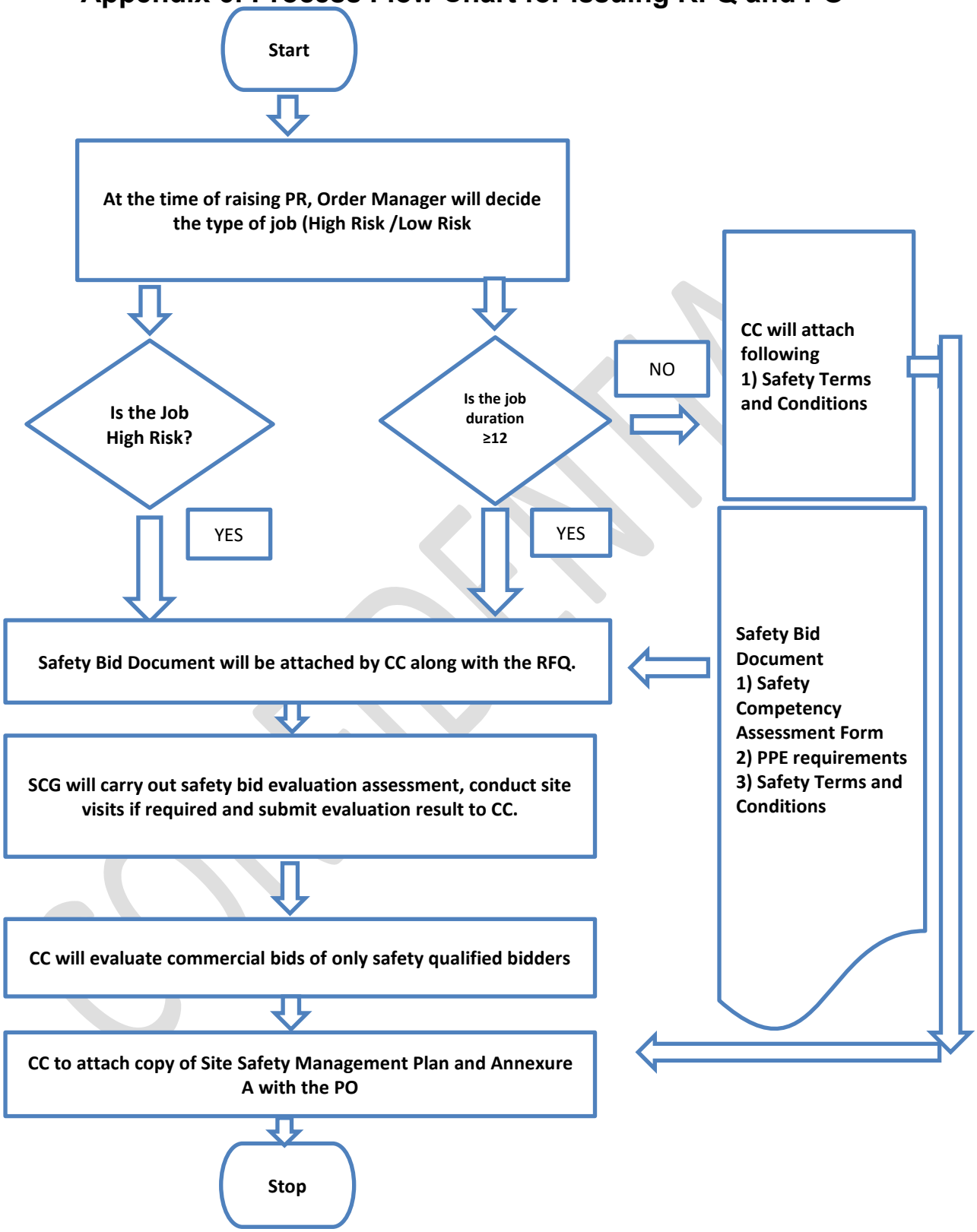
S No	Description of violation	Severit	Penalty
1.	Working without Permit	5	5000/-
2.	Untrained (TPSDI) worker on high-risk jobs.	5	5000/-
3.	Unhygienic/Bad condition of PPE	2	250/-
4.	Not following Tata Power Procedure & Standard	4	2000/-
5.	Unsafe Act/Condition of Severity 4	4	2000/-
6.	Unsafe Act/Condition of Severity 5	5	5000/-
7.	No Earthling of Electrical equipment	5	5000/-
8.	Damaged welding cable	5	5000/
9.	Violation of Positive Isolation Procedure (LOTO Not followed)	5	5000/
10.	ELCB of more than 30 mA/ELCB not working	5	5000/
11.	On/Off switch of welding m/c not working	5	5000/
12.	Electric cable tied with metal wire	5	5000/
13.	Leakage found DA hose / cylinder	5	5000/
14.	Use of LPG	5	5000/
15.	Use of IC engine based Three-wheeler at the work site.	5	5000/
16.	Starting the job without Toolbox Talk	5	5000/
17.	Spatter falling on DA hose / Gas-line/ pathways / Equipment	5	5000/
18.	No safety latch in crane hook	5	5000/
19.	Load raised or swung over people or occupied areas of buildings	5	5000/
20.	Persons standing in swing area of construction equipment.	5	5000/
21.	Using damaged slings.	5	5000/
22.	Unstable scaffolding/nonstandard Scaffolding in use	5	5000/
23.	Handrails and mid-rails are missing	5	5000/
24.	Safety Harness not anchored with lifeline/fixed structure	5	5000/
25.	Fall arrestor not provided/ Not being used.	5	5000/
26.	Double lifeline not used for working at height	5	5000/
27.	No rubber mat in Electrical Distribution (DB) room	4	2000/-
28.	Water found accumulated in Electrical Distribution room/near welding machine.	4	2000/
29.	Inserting electric cables into socket, without using plug.	4	2000/
30.	Use of damaged electrical cable/two core cables.	4	2000/
31.	Inflammable material found in Distribution Room / welding areas.	4	2000/
32.	Loose material falling into excavated pit	4	2000/
33.	Water logging into excavated pit /trenches	4	2000/
34.	No / inadequate Barricade	4	2000/
35.	Undercut / cave-in found on sides of excavated pits	4	2000/

36.	Grinding wheel/ Coupling/ Piling winch/other rotating parts without guard	4	2000/
37.	The HMV/Mobile Crane operator does not have a valid HMV driving license.	4	2000/
38.	The loading area is not leveled properly.	4	2000/
39.	Ladder not anchored at top	4	2000/
40.	Opening found in working platform of scaffolding/floor	4	2000/
41.	Inadequate illumination at the working area	4	2000/
42.	Loose material lying on Gantry, platform	4	2000/
43.	Cleaning with Compressed Air.	3	500/-
44.	Gas Cylinders using without cap.	3	500/
45.	Gas Cylinders stored without securing	3	500/
46.	Bringing inside any other chemicals, apart from approved by Safety dept.	3	500/
47.	Using drum for sitting or accessing height.	3	500/
48.	Misusing emergency facilities like fire hydrant line/ hose box/ spray system/ eye wash etc.	3	500/
49.	No provision of Safety net where falling materials or tools may occurs	3	500/
50.	Taking electrical supply from non-designated outlet (other than socket).	3	500/
51.	Restricted gangways due to unwanted materials.	3	500/
52.	Not reporting incident.	3	500/
53.	Entering into restricted area like switch yard/ hazardous storage	3	500/
54.	Work without supervision	3	500/
55.	Parking of vehicle without applying wheel choke at right front-front and left rear-rear wheels other than passenger cars.	3	500/
56.	Heavy Vehicle without helper or co-driver.	3	500/
57.	Not wearing florescent safety jacket at site.	3	500/
58.	People travelling in load body of vehicle.	3	500/
59.	Parking of vehicles at non designated area.	3	500/
60.	Shifting heavy materials without guide ropes.	3	500/
61.	Using other than 24V lamp inside the confined space/Use of other than 24V lamps.	3	500/
62.	Angular loading/ lifting with Crane or hoist.	3	500/
63.	By passing the limit switch/ Safety Interlock.	3	500/
64.	Housekeeping activities on road without proper barricade.	3	500/
65.	Trying to board or alit from running vehicle.	3	500/
66.	Cylinder Valves of Gas cylinders not closed when not in use.	3	500/
67.	Flash-back arrester not used.	3	500/
68.	Hand Trolley wheel found damaged.	3	500/

69.	Guy ropes of required length on both sides of object are not used during movement with load.	3	5/ 00/
70.	Scotch block/wedge not provided, when the vehicle is parked.	3	500/
71.	Suitable Trolley not provided to hold the cylinders.	3	500/
72.	Locked First Aid box	3	500/
73.	Caution boards, danger signs (luminescent /red) along with emergency contact number are not found displayed.	3	500/
74.	Person found jumping barricading tape	3	500/
75.	Stacking of pipes, pile casing, drums without chock blocks/wedges	3	500/
76.	The terrain on which Heavy Equipment/Machinery moves is not reasonably hard.	3	500/
77.	Without Safety Helmet at working sites	4	250/-
78.	Without Crash Helmet (on bikes)	4	500/-
79.	Without Full body double lanyard Safety Harness (for work at height)	5	5000/-
80.	Without Hand gloves - Material Handling, Welding, Cutting,	4	100/-
81.	Without Safety goggles/ face shield - Welding/Cutting /Grinding	5	5000/-
82.	Handling Chemical without PVC Apron	5	5000/-
83.	Smoking in prohibited area (Closed Go-downs, Storage of flammable material, Storage of Gas cylinders)	5	1000/-
84.	Sleeping at Workplace	3	100/-
85.	Driving beyond speed limit	3	1000/-
86.	Seat Belt While Driving (for front seat passengers and driver)	3	500/-
87.	Driving without license	4	1000/-
88.	Heavy Commercial vehicles without reverse horn	3	500/-
89.	Nonfunctional Head light/ taillight and side indicators	3	100/-
90.	Using Mobile Phone During Driving	5	5000/-
91.	Poor visibility of registration number/ without registration number	3	100/-
92.	Broken/ without Side view mirror	3	100/-
93.	Over speeding above specified limit	3	500/-
94.	Broken/ Without Pressure gauge on Oxygen/ LPG / Acetylene cylinder.	3	500/-
95.	Without Flash back arrestor on Industrial Acetylene & Oxygen cylinders.	5	5000/-
96.	Spillage of hazardous material/chemicals during transportation	4	2000/-
97.	Electrical equipment without Earthing/ ELCB/ Double Insulation Cable.	5	5000/-
98.	Lifting Tools & Tackles used without/ expired Test Certificates.	5	5000/-
99.	Housekeeping repeatedly not maintained		

100.	• First Time	3	Warning
101.	• Second Time	4	1000/-
102.	• Third Time	5	5000/-
103.	Serious Violation of House Keeping (after 1st or 2nd warning to be decided by Project Manager depending on the severity)	5	Rs.10000/- and above
104.	Repeat Violation of same nature	5	5 X Penalty for Violation
105.	Appointment of subcontractor without his Safety Bid Evaluation and/or without the permission of engineer in charge or Order manager.	5	5% of Contract Value

Appendix 6: Process Flow Chart for issuing RFQ and PO



Appendix 7: CSM-F-7 Safety Competency Form (Template)

Name of the Vendor/Bidder : -

Name of the Sub Vendor (If job is given to Sub Vendor) : -

Description of the Job : -

Request for Quotation (RFQ) No. :-

Vendor/Bidder to mandatorily provide the below safety competency related information.

1. Proposed Manpower Deployment Schedule: -

Category of Manpower Deployed	Minimum Qualification & Experience	Proposed Numbers against each category month-wise			
		Month 1	Month 2	…	Month n
Project Manager					
Site-In-Charge (Site Manager)					
Shift-in-Charge					
Safety Officers					
Supervisors					
Technicians					
a……					
b……..					
Highly Skilled Workmen					
a……					
b……..					
Skilled Workmen					
Semi-Skilled Workmen					
Unskilled Workmen					
Total Manpower					

Instructions to Bidder to fill:

1. Bidder to provide the overall site manpower deployment schedule as above.
2. Bidder to indicate (through colour code mentioned below) their direct and sub-contracted employees

Direct bidder employee
Partly Direct / Partly sub-contracted
Sub-Contracted

3. Against each of the category, bidder to indicate the minimum qualification and experience of the proposed manpower.
4. Rows can be added to also identify other specialised manpower e.g. specific details to be included for high risk activities operators
5. Columns can be extended to the actual duration of Site activities.
6. Bidder to note that if operations is in shifts, then Shift-in-charge / safety officers are required for each shift of operation.

2. List of Tools, Tackles, Machines and Equipment: -

Bidder/ Vendor to provide the list of tools, tackles, equipment **to be used during the job / project execution**. Bidder/Vendor to ensure that all the lifting tools and tackles, pressure

vessels are duly certified by the competent person authorised by the Chief Inspector of Factories of the respective state prior to start of the job

Sr. No.	Description of Tools / Tackles	Capacity / Rating	Quantity	Make	Remarks
1					
2					
3					
4					
5					
6					
7					
...					

3. Safety Records:

Bidder to provide the details of fatalities and lost workday cases (LWDC), occurred in last three years (data to be provided for the last completed FY and preceding 2 years).

Description	Safety Data for Last 3 Years		
	ar 1 (Last FY)	Year 2	Year 3
	20__ - __	20__ - __	20__ - __
Fatalities (Nos.)			
Lost Workday Cases (Nos.)			

In case of no fatalities, LWDC during any year, the form may be filled stating NIL against the respective year. Bidders are encouraged to also submit the RCA / incident investigation reports and the learning's implemented out of the above reported incidents

4. Job Safety Plan/ Method Statement:

Bidder to provide / enclose a detailed Site/Job Safety Plan along with a Method statement detailing the execution philosophy (how the bidder intends to execute the Job/Project), identifying all key activities which are required to be performed by the contractor at Site. Bidder to also list down all high-risk activities and provide the Hazard Identification and Risk Assessment (HIRA) for all such high-risk activities involved in the site work.

(Use Method Statement template attached as annexure A and sample as attachment B)

5. Management System Certification: -

Sr.	Certification	Yes / No	If Yes, ar of Certification	If No, et date for Certification
	ISO 9001			
	ISO 14001			
	OSHAS 18001 / ISO 45001			
	Any other (please specify……..)			
Note: Please attach certificates to support above. In case not accredited for above but applied for, application letters may be attached.				

Appendix 8: CSM-F-8 PPE requirements

The Contractor shall ensure that the following PPE of Approved standards shall be available at all time and shall be used by his employees with no exception whatsoever.

1	All contractor's employees at site	Safety Florescent Jacket (orange color), Safety helmet & safety shoes with Composite or steel toe cap
2	Workers mixing asphalt, cement, lime / concrete	Safety goggle & protective Hand gloves and footwear, Nose mask.
3	Welders / Grinders	Welding screen/goggles, safety shoes, leather hand gloves, aprons, leg guard
4	Stone breaker	Protective goggle, hearing protection, anti-vibration hand gloves and Protective clothing.
5	Electricians	Rubber hand gloves & Electrical resistant shoes.
6	Workers engaged in insulation using glass wool etc.	Respiratory mask & leather Hand gloves, goggles.
	Workers engaged in coal handling plant, ash handling plant and working in high dust area.	Dust mask, Hand gloves, protective goggles.
7	Workers working at a height of 1.8 Meter or above.	Double lanyard full body harness, fall arrestor and safety net made of reinforced nylon fiber ropes firmly supported with steel structures

• **PPE shall be conforming to BIS/DGMS/DIN specifications**, **in good condition and shall be comfortable to his employees, when used.**

Appendix 9: CSM- F-10 Site Safety Management Plan / Method Statement

Site Safety Plan / Method Statement (Template)

This Method Statement describes the specific safe working methods which will be used to carry out the described work. It gives details of work procedure with control measures to counter health and safety issues related to this work. The listed content of this Method Statement can be changed/modified subjected to job scope / specifications, but task specific method statement once finalized & approved, that should not be modified during work execution without permission from the approving authority.

Project/Job Name			
Scope of work: -			
Drawing References: -			
Detail of Sub contractors involved: -			
Method Statement Prepared By: - Designation: - (e.g. Site Manager)		Signature	Date

1.0 Introduction (*Describe purpose of the work, give details of type and scope of work being carried out);*

2.0 Location of Work (*Give site address and precise location on site where work is to be carried out.)*

3.0 Safety Document /Specific Approval Required (Details of any safety documents or specific approval i.e. Client specific approval required to undertake the work)

5.0 Role & Responsibilities of Personnel/Parties Involved in activities: -Clearly define role and responsibilities of all personnel involved in activity i.e. Site management staff including subcontractors' parties- Main contractor Project/Site Manager, Sub Contractor Site Manager, Project Engineer, Safety officer, Competent Supervisory Staff)

6.0 Working/Activity Description: - It *is important that all operatives should have clear idea of those operational sequences and responsible supervisor must verify their competency prior to their engagement in operation.*

6.1 Pre-Working Checks

6.2 Resources (Equipment, tools including manpower) Details *i.e. Equipment and Tools, specific operational equipment, test kits, lifting resources, Details of materials to be used in operation, including any reference to COSHH assessments in case of use of any chemicals, Details of the manpower allocated to the task, e.g. titles, qualifications, competences, direct manpower, contractors. Details of plant, tools and equipment to be used for the work, including the availability of relevant statutory documents, checks or inspections etc. Details of fencing, barriers, cones, chains, dangers notices, warning signs etc.*

Tools required for work:

Sr.No	Tools /Equipment /Machine	UOM	Required Qty.	Remark
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

6.4 Operational Sequence of work*: - Full description of the work, setting out the methodology in a sequential manner, including any reference to any identified operational restraints. Also refer here sec. 5.0 responsibilities part for every step of work sequence).*

Sr.No	Activity	Details of job sequence	Risk Involved	Control Checks

1.				
2.				
3				
4				
5.				

6.7 Final Checks & restoration of work area after completion of work :- *Those checks to be carried out by responsible supervisor in witness of his line hierarchy by use of specific checklist of certain operational checks and once those completed satisfactory, PTW (if applicable) to be closed and isolation arrangements to be restored by removing barricades/cautionary tags.*

7.0 Task Specific Hazards: - *Refer to Task Specific Risk Assessment and attach in appendix*

Attachment: - Specific Risk Assessment

In addition, please provide below control measures in risk assessment *(as applicable).*

Fall Protection Measures: (Where Work at height cannot be avoided)							
Control Measures for Electrical Hazards							
Others Hazard if any (please provide details)							
Hazardous Substances to be used in job : (Attach MSDS if required)							
	Yes /No	Yes /No	Yes /No	Yes /No	Yes /No	Yes /No	Yes /No

7.0 Emergency Provisions: -*Relevant operational possibility of a programme in the case of emergency situation i.e. electrical supply restoration. In addition emergency response provisions i.e. first aiders, fire fighting, and first aid arrangements, nearest onsite/offsite emergency response also to be considered during emergency planning.*

8.0 "5S issues" / Waste Disposal/ Housekeeping and Environmental issues: -*Details waste disposal processes and or housekeeping activities, Details of environmental impacts and control measures.*

9.0 Personal Protective Equipment (PPE):- (*Tick on PPE requirements for the task/Job*

Required Personnel Protective Equipment:	 Safety Boots	 Hard Hats	 Safety Gloves	 Hearing Protection	 Eye Protection	 Respiratory Protection	Other: 1. Hi-Viz 2. Coveralls 3.

10.0 First Aid facilities and Nearby Hospitals Details

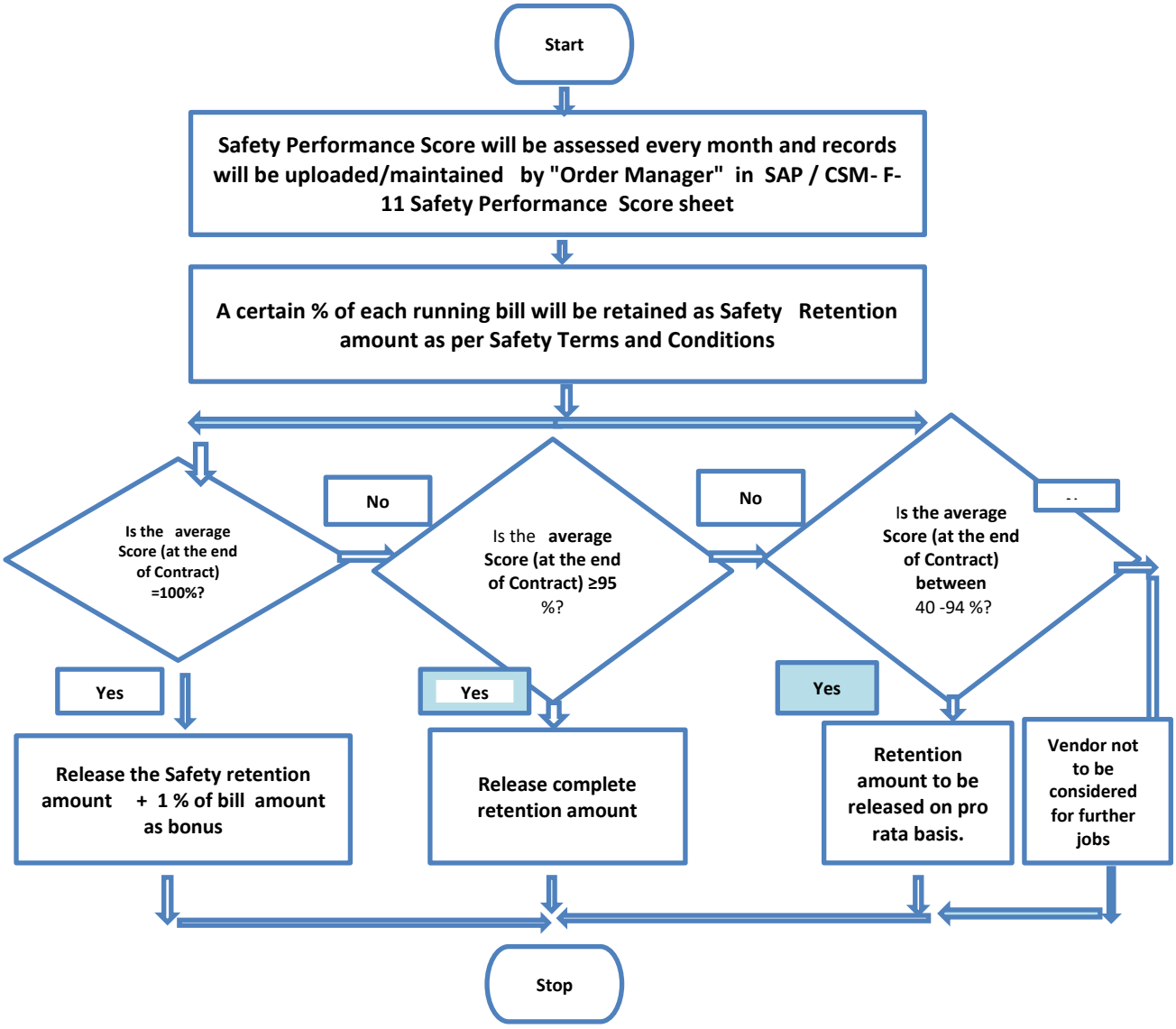
	First Aid Facilities:	Name of On-Site First Aider:	
		First Aid Box Location:	
		Location of Nearest Hospital:	

11.0 Occupational Health, Fitness and COVID-19 related Preparedness:

1. Please give a brief writeup / methodology of your organization planned to avoid impact of the COVID-19 pandemic at Tata Power working site.

2. Please give brief details of occupational health and hygiene related interventions planned by your organisation to ensure good health and fitness of workforce at Tata Power site.

Appendix 10: Process Flow Chart for Safety Performance Evaluation



Appendix 11: CSM- F-11 Safety Performance Score

S. No	Parameter	Unit of Measurement	Target	Weightage	Actual Performance	Actual Score
Lead Indicator						
1	% of Employee certified in TPSDI/Authorized agency	Number	50%	10		
2	CFSA score (Annexure 6.1)	Average Severity of Violations	1.49	20		
3	Monthly inspection completed for Critical Equipment, lifting Tools & Tackles and hand tools used at site	Number	80%	10		
4	Condition of critical tools, tackles and equipment	Number	100%	10		
Lag Indicator						
1	Number of Fatalities	No	0	30		
2	Number of Lost workday case (LWDC) (reportable)	No	0	10		
3	Man-days Lost	Man-days	0	10		
					Final Score	
					Invoice Value	
					Amount to be released	

Safety Performance Evaluation Criteria

Lead Indicators

	Target			
% of Employee certified in TPSDI/Authorized agency	50%	100%	Less than 100%	
Score		10	5	
	Target			
CFSA score	<=1.49	1.5 to 2.5	2.51 to 3.5	>=3.51
Score	20	15	10	0
	Target			
Monthly inspection completed for Critical Equipment, lifting Tools & Tackles and hand tools used at site	>=80%	79 to 50%	<50%	
Score	10	7	0	
	Target			
Condition of critical tools, tackles and equipment	100%	<100%		
Score	10	0		

Lag Indicators

Number of Fatalities	0	>0	
Score	30	0	
Number of LWDC (reportable)	0	>0	
Score	10	0	
Number of man days lost	0	1 to 5	>5
Score	10	5	0

Appendix 12: CSM-F-5 Safety Potential Evaluation Criteria for Vendor Registration

At the time of vendor registration, vendor will be registered under 3 categories

1) **Category A**- Vendors eligible to carry out High risk Jobs
2) **Category B**- Vendors eligible to carry out technical jobs that are low risk
3) **Category C**- Vendors eligible to carry out administrative and office jobs
4) **Category D**- Outsourced Jobs / Consultants /Medical Practitioners / Suppliers etc

For vendors to be registered under **Category A**, a safety potential evaluation will be carried out based on following parameters.

Sr. No	Description	Weightage (%)	Actual Score	Remarks
1	Does the contractor have a valid ISO 45001/ OHSAS 18001/ Certification?	30		
2	During site visit check for safety adequacy at site	30		Annexure - 12.1
3	Check the Safety statistics of Contractor	10		Annexure - 12.2
4	Check the Safety orientation & training process of Contractor	15		Annexure 12.3
5	Check the organizational structure for safety professionals & engineers / supervisors.	10		Annexure - 12.4
6	Certified/skilled workers as a percentage of overall workforce	5		
	Total	100		

Evaluation Criteria for Category B

Sr. No	Description	Weightage (%)	Actual Score	Remarks
1	Does the contractor have a valid ISO 9001 certification?	30		
2	During site visit check for safety adequacy at site	30		Annexure -12.1
3	Check the Safety statistics of Contractor	10		Annexure -12.2
4	Check the Safety orientation & training process of Contractor	15		Annexure -12.3

5	Check the organizational structure for safety professionals & engineers / supervisors.	10		Annexure -12.4
6	Certified/skilled workers as a percentage of overall workforce	5		
	Total	100		

Evaluation Criteria for Category C

Sr. No	Description	Weightage (%)	Actual Score	Remarks
1	Does the contractor have a valid ISO 9001 certification?	40		
2	Check the Safety statistics of Contractor	40		Annexure - 12.2
3	Check the Safety orientation & training process of Contractor	20		Annexure - 12.3
	Total	100		

Annexure 12.1: Evaluation Criteria for Category D:

Category D does not require any evaluation as it is for outsourced job outside the Tata Power company premise.

Annexure 12.2

Check List – Adequacy of Safety Statistics of Service Provider			Actual Marks obtained	Remarks
1	Check the safety statistics for last 3 years (LTIFR and LTISR)	Marks Statistics available: 5 Statistics not available: 0		
2	Check the trend LTIFR for last 3 years	LTIFR value / Marks 0 to 0.2: 5 0.21 to 0.3: 2.5 >0.3: 0		
3	Check the trend of LTISR last 3 years	LTISR value / Marks 0 to 2: 5 2 to 3: 2.5 >3: 0		
4	Has there been any Prosecution/Conviction for any contravention with regard to Safety & Health provisions under the Factories Act /Electricity Act/ BOCW Act and Rules framed there under?	Marks No Prosecution: 10 Prosecution: 0 To be provided in written on letter head		
	Total	**25**		

Annexure 12.3

Check List – Adequacy of Safety orientation & training process of Service provider			Actual Marks obtained
1	Records of safety trainings provided to safety officer/supervisor/workmen during last 1 year as percentage(%) of total employed by service provider	**Safety Officer** / Marks ≥80% of employees / 5 50 to 79 % of employee / 2.5 <50% / 0	
		Safety Supervisor / Marks ≥80% of employees / 10 50 to 79 % of employee / 6 <50% / 0	
		Workmen / Marks ≥80% of employees / 10 50 to 79 % of employee / 6 <50% / 0	
	Total	25	

Annexure 12.4

Check List – Adequacy of organizational structure for safety professionals & engineers / supervisors.			Actual Marks obtained
1	Check availability of number of safety officers from government recognized institute as per workforce strength.	Marks 1 in 50 employees / 10 1 in 100 employee / 6 Any other / 0	
3	Check availability of qualified workforce from government recognized institute/TPSDI.	Marks 100% of safety officers qualified / 5 50 – 99% of safety officers qualified / 3 <50 / 0	
	Total	15	

Appendix 13: CSM-F-9 Safety Bid Evaluation Criteria

The User has to select whether the job is high risk/ long duration at time of raising the PR.

1) The decision whether job is "**high risk** "or not has to be made by order manager on the basis of Risk involved (Risk Priority Number in HIRA) of the Jobs. An indicative list of high-risk jobs is attached as annexure
2) If a technical job is of low risk with estimated duration of the contract is 1 year or more the job should be treated as "**long duration**".
3) All Safety bids will be evaluated by Safety Concurrence Group. Structure of SCG will be declared by Corporate safety. Corporate safety team will audit bid evaluation process of a few selected jobs and Quality of evaluated safety Bids.
4) Records of jobs sent by for Safety Bid evaluation shall be maintained by Corporate Contract team in existing tracing sheet along with other jobs.
5) For Safety Bid Evaluation will be based on following parameters.

		Minimum Requirement	**Weightage (%)**	**Score Obtained**
Manpower	**Safety Officer (1 per 500 workers)**	**Qualification-** Officer shall possess Advance Diploma In Industrial Safety by state technical board. **Experience**- Minimum 1-year experience in relevant field as mentioned in the job in PR.	5	
	Safety Supervisor (1 per work site up to max. 50 workers)	**Qualification-** Supervisor shall possess ITI/ Diploma in relevant field. **Experience**- Minimum 2-year experience in relevant field as mentioned in the job in PR. **Training** – Trained and certified by TPSDI or equivalent institute in relevant safety procedures. **Note:** On request of the contractor/Users -TPDSI should vet & certify the skilled & experienced Technician if Technical Qualification is not adequate.	5	
	Technician (Skilled workers as electrician, rigger, fitter, welder, cable jointer, line men etc)	**Experience**- Minimum 2 year experience in relevant field as mentioned in the job in PR. **Training** – Trained and certified by TPSDI or equivalent institute in relevant safety procedures.	5	

Tools & Tackles	Equipment / Machines/ Tools & Tackles(lifting and shifting tools)	The list of Equipment /Machines / Tools and tackles to be used for job to be submitted by the contractor. Evaluation of the list will be carried out based on 1) Suitability as per the relevant job 2) Make and age of the tools from authorized agencies defined by the user. 3) Certification by the competent authority of respective state.	30	
Safety Records	Safety Records	Safety Records for last 3 years (as per vendor or as per our knowledge) – Recommendation?	15	
Safety Plan	HIRA/Contract Job Safety Plan	Adequacy of HIRA and Job Safety Plan with respect to relevant job. More weight age will be given to vendor for using mechanized work and advanced tools and equipment	20	
Accredited Bodies certificate	ISO-9001	ISO-9001	2	
	ISO-14001	ISO-14001	3	
	OHSAS 18001 ISO 45000	OHSAS 18001/ISO 45000	15	
		Total Score		

6) Vendor entitled to carry out the job only when qualified for the safety evaluation as follows:
   Contractor is qualified in safety bid only if his total score is more than 70% in all category 1 jobs such as high risk/long duration.
7) The Corporate Contract has to ensure that the vendor provides the filled “Safety Competency Form” along with the quotation.
8) Corporate Contract will forward the Safety Competency Form received from the contractor to the Safety Concurrence Group for evaluation.
9) In case SCG wants to visit the site, the Safety Competency will be based on evaluation at the time of site visit Annexure 13.1

Annexure -13.1:

Checklist to be used: During site visit to check the adequacy Safety systems.			
		Observation	Score* (1-5)
1	Check the adequacy of safety policy and Safety Management system of the contractor.		
2	Does the contractor have written down safety procedures?		

3	Check the records of Near miss, unsafe act, unsafe conditions and incidents.		
4	Check the organization setup to implement the safety systems at site (safety officer, safety supervisor)		
5	Check whether safety meeting and toolbox talk carried out regularly and records maintained or not.		
6	Is the process of incident investigation adequate or not?		
7	Verify incident reporting and recording system		
8	Check the usage of equipment/tools and tackles.		
9	Check for housekeeping at site		
10	Check the use of PPEs and general behavior of workforce towards safety		
	Total Score		
	Site Visit Score		

Score*- rating on the scale of 1-5 to be given based on the observations on site. Score of 1 is the lowest and core of 5 is the highest.

Appendix 14: CSM-F-11.1 CFSA Format

CONTRACTOR FIELD SAFETY AUDIT						
Project Name :						
Date:						
Description of Severity rating:			**Audit Team:**			
	1 = Untidy area, minor issues, sets poor example					
	2 = Restricted access, unacceptable trash, disorderly					
	3 = Rule or procedure violation, potential injury					
	4 = Unsafe condition, serious injury potential					
	5 = Immediate serious injury potential, stop activity immediately and correct		**Audit Time:**			10:00hrs -11:30 hrs
			Weather:			cloudy
	Description	**Responsible**	**Number Personnel Observed**	**Violations**	**Remarks**	Leading Indicators

		Engineer	Contractors	Good Citizens	Violators	Number of Violations	Severity	Violations x Severity		4 & 5	PPE	Unsafe Act	Unsafe Condition
Area													
1													
	Sub Totals			**0**	**0**	**0**	**0**	**0**		**0**	**0**	**0**	**0**
	% of Observed People Working Safely												
	Number of Violations												
	Average Severity of Violations												
	Number of Severity 4 & 5 Violations												
	% of 4 & 5 Violations												
	Approximate Number of Workers Observed												
	Number of People on Site												
	% of Workers Observed												

Appendix 15: Indicative List of High-Risk Jobs

To access the exhaustive list of High-risk jobs, please refer the following documents

1) High Risk Jobs- Generation
2) High Risk Jobs- T&D
3) High Risk Jobs- Renewable

Indicative List of High-Risk Jobs -Generation Cluster					
Sl. No.	**Jobs**				
1	Demolition / Painting of Chimney				
2	Survey Sounding Jobs in Sea				
3	Dredging at Coal Birth Jetty				
4	Maintenance / Testing and Replacement of Extra High Voltage (132 KV etc.) Switchyard equipment				
5	Maintenance of EOT Cranes				
6	Deep excavation (5 feet or more) near existing buildings /Structure s				
7	Working inside confined spaces (entry through manhole)				
8	Operation Maintenance of elevators				
9	Working on Live control Circuits for identification of faults				
10	Cable laying and termination Jobs				

Indicative List of High-Risk Jobs - T&D Cluster					
Sl. No.	**Jobs**				
1	Transmission Line Tower Erection on columns, near live lines, In congested areas, In creeks, In the Sea				
2	Conductor Stringing on Tower Using Tensioner & Puller in the area such as Line Crossing, Near Live lines, Congested Areas, Road Crossing, Bridge Crossing, Railway line Crossing, In creeks ,In the Sea				
3	Cable Pulling by Using winch Machine in City and Rural Areas				
4	Hot Washing of HT and Extra HT lines, Towers and switchyards equipment				
5	Installation of Lifts				
6	Installation of EOT Cranes				
7	Tower Dismantling				
8	Working on H Frame /Pole mounted Transformers				
9	Excavation in operational Area heaving power cables in receiving station				
10	Identification and spiking of cable / disconnection of cables from poles				

Indicative List of High-Risk Jobs - Renewable Cluster					
Sl. No.	**Jobs**				
1	Working on Electrical Panels				
2	Hi Potting of Equipment				
3	Battery commissioning and maintenance				
4	Working on the nasal of Wind Turbine				
5	Working on live electrical switchyard, material Handling and Equipment installation				
6	Roof Top Solar Panels Installation and maintenance				
7	Working in live Electrical Switchyard, Material Handling, equipment installation				
8	All maintenance activities that requires climbing on Towers /Structures / Transformer/ GODs				
9	Loading and Unloading of Solar Panels on trucks				
10	Structural Repair /Dismantling work at height.				

ANNEXURE X
TATA CODE OF CONDUCT

The Owner abides by the Tata Code of Conduct in all its dealing with stake holders and the same shall be binding on the Owner and the Contractor for dealings under this Order/ Contract. A copy of the Tata Code of Conduct is available a tour website:

https://www.tatapower.com/pdf/aboutus/Tata-Code-of-Conduct.pdf

The Contractor is requested to bring any concerns regarding this to the notice of our Chief Procurement & Stores e-mail ID: pkjain@tatapower.com.

ANNEXURE XI
ENVIRONMENT & SUSTAINABILITY POLICY

CORPORATE ENVIRONMENT POLICY

Tata Power is committed to a clean, safe and healthy environment, and we shall operate our facilities in an environmentally sensitive and responsible manner. Our commitment to environmental protection and stewardship will be achieved by:

- Complying with the requirements and spirit of applicable environmental laws and striving to exceed required levels of compliance wherever feasible
- Ensuring that our employees are trained to acquire the necessary skills to meet environmental standards
- Conserving natural resources by improving efficiency and reducing wastage
- Making business decisions that aim towards sustainable development
- Engaging with stakeholders to create awareness on sustainability

(Praveer Sinha)
CEO & Managing Director

Date: 15th June, 2018

TATA POWER
Lighting up Lives!

CORPORATE SUSTAINABILITY POLICY

At Tata Power, our Sustainability Policy integrates economic progress, social responsibility and environmental concerns with the objective of improving quality of life. We believe in integrating our business values and operations to meet the expectations of our customers, employees, partners, investors, communities and public at large

- We will uphold the values of honesty, partnership and fairness in our relationship with stakeholders
- We shall provide and maintain a clean, healthy and safe working environment for employees, customers, partners and the community
- We will strive to consistently enhance our value proposition to the customers and adhere to our promised standards of service delivery
- We will respect the universal declaration of human rights, International Labour Organization's fundamental conventions on core labour standards and operate as an equal opportunities employer
- We shall encourage and support our partners to adopt responsible business policies, Business Ethics and our Code of Conduct Standards
- We will continue to serve our communities:
  - By implementing sustainable Community Development Programmes including through public/private partnerships in and around our area of operations
  - By constantly protecting ecology, maintaining and renewing bio-diversity and wherever necessary conserving and protecting wild life, particularly endangered species
  - By encouraging our employees to serve communities by volunteering and by sharing their skills and expertise
  - By striving to deploy sustainable technologies and processes in all our operations and use scarce natural resources efficiently in our facilities
  - We will also help communities that are affected by natural calamities or untoward incidence, or that are physically challenged in line with the Tata Group's efforts

The management will commit all the necessary resources required to meet the goals of Corporate Sustainability.

(Praveer Sinha)
CEO & Managing Director

Date: 15th June, 2018

TATA POWER
Lighting up Lives!

Document Title: DC System for 33/11 kV Primary Substation

Document No: A&T/2021/SPEC-03/PSS DC SYSTEM

SECTION – A

PROJECT SPECIFICATIONS

TP CENTRAL ODISHA DISTRIBUTION LIMITED
(A Tata Power & Odisha Govt. Joint Venture)
2nd Floor, IDCO Tower, Janpath, Bhubaneswar, Odisha 751022

Revision	Date	Description	Approvals		
			Prepared By	Checked By	Approved By
R0	20th Dec 2021	Released for Procurement	TKB/GSB	AKA	RKR

Organization of the Specification

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Section – A

Project Specification

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1.0 Intent of Specification

TP Central Odisha Distribution Limited (TPCODL) hereinafter called the "OWNER" or "PURCHASER", proposes to implement DC System for 33/11kV Primary Substations for Control Voltage and Automation purposes. The proposed DC system shall communicate with the RTU over MODBUS RTU protocol for real time status in the substation.

Bidder shall refer the entire project specifications to understand the execution methodology and interface equipment for the complete Scope of Work of this project.

The document covers the specific requirements for complete design, detailed engineering, installation, testing and commissioning of DC system for 33/11kV Primary Substations.

This specification describes the technical requirements of the systems to be procured.

1.1 Introduction to TP Central Odisha Distribution Limited

TP Central Odisha Distribution Limited (TPCODL) is incorporated as a joint venture of Tata Power (51%) and Govt of Odisha (49%) on the Public-Private Partnership (PPP) model. Govt. of Odisha (GoO)'s share is held by it through its 100% owned company GRIDCO. TPCODL took over the license of distribute electricity in the central part of Odisha, which was earlier served by erstwhile CESU. TPCODL's utility business is governed by the provisions of license issued by Hon'ble OERC for distribution and retail supply of electricity in Central Odisha.

TPCODL licensed area is spread over a geography of 29354 Sq. Km and serve the registered consumer base of 2.6 million with a peak load of around 1580 MW. It receives electrical power at a sub transmission voltage of 33 kV from Odisha Power Transmission Corporation Limited (OPTCL) 220 / 132 / 33 kV Grid Substations and then distributes the power at 33 kV / 11 kV / 440 V / 230 V depending on the demand of the consumers. For effective operations, the license area is divided into 5 circles which is further sub divided into 20 Divisions and 64 Sub-divisions which manage the commercial and O&M activities in order to serve its consumers. The entire TPCODL distribution network covering all the 5 circles i.e. Bhubaneswar # 1, Bhubaneswar # 2, Cuttack, Dhenkanal and Paradeep is comprising of 371 nos. of Primary Sub-Stations (33/11kV). Out of the total 371 substations, 178 substations are 33/11kV Primary substations which is being intended for replacement of the DC System.

1.2 General Information of TP Central Odisha Distribution Limited

Description	UoM	Quantity
Distribution Network	Sq. Km.	29354
Number of Circles	Nos.	5
Number of Divisions	Nos.	20
No. of Sub-Divisions	Nos.	64
Consumer Base	Million	2.6
AT & C loss (as on 31st Mar 2020)	%	30.44
Primary Substations	Nos.	371
33 kV Feeders	Nos.	190
11 kV Outgoing Feeders	Nos.	1019
Total Circuit length 33 KV Feeders	Kms	3911.58
Total Circuit length of LT Network	Kms	55359
Power Transformers (33/11 kV)	Nos.	666
Distribution Transformers	Nos.	71889
Total Installed Capacity of Primary S/s	MVA	4475
Peak Demand	MW	1603
Annual Consumption	MUs	8600

2.0 Project Information

Sl. No.	Item Description	
1.0	**Owner**	TP Central Odisha Distribution Limited (A Tata Power & Odisha Govt. Joint Venture), 2nd Floor, IDCO Tower, Janpath, Bhubaneswar, Odisha 751022
2.0	**Consultant**	Not Applicable
3.0	**Location of the sites**	Within the Operational Area/Distribution Network of TPCODL
4.0	**Connectivity**	Sites are connected by road to Bhubaneshwar, Cuttack, Paradeep, Dhenkanal
5.0	**Transport**	Access roads are available for movement of materials to site. Movement of heavy materials would be through existing roads/rail up to TPCODL Premises
6.0	**Maximum Altitude above Sea Level**	1000 mtr.
7.0	**Climatic Conditions**	
7.1	**Temperatures**	
(a)	Maximum Ambient Air Temperature	50 Degree C
(b)	Maximum Daily Average Ambient Air Temperature	35 Degree C
(c)	Minimum dry bulb temperature	10 Degree C
(d)	Design temperature for electrical equipment / devices	65 Degree C
7.2	**Relative humidity**	
(a)	**Maximum during monsoon**	100%
(b)	**Minimum during December**	22%
(c)	**Design humidity**	95%
7.3	**Rainfall**	Annual average rainfall is about 150 cm (most of which occurs during the monsoon season from June to September)
(a)	Average Number of Thunderstorm days per annum	70 (isokeraunic level)
(b)	Average Number of Rainy Days per Annum	120 days
7.4	**Wind Velocity:** 300 km/hr., 200 km/hr. and 160 km/hr. environmentally, some of the regions, where the work will take place includes coastal areas, subject to high relative humidity, which can give rise to condensation. Onshore winds will frequently be salt laden. On occasions, the combination of salt and condensation may create pollution conditions for electronic equipment. Some places are in heavily industrial polluted areas. Therefore, Outdoor material and equipment shall be designed and protected for use in exposed, heavily polluted, salty, corrosive and humid coastal atmosphere.	
7.5	**Seismic conditions**	The proposed sites are in seismic zone III as per the Indian Standard IS 1893 and importance factor of 1.75
(a)	Earthquakes of an intensity in horizontal direction	Equivalent to seismic acceleration of 0.3g
(b)	Earthquakes of an intensity in vertical direction	Equivalent to seismic acceleration of 0.15 g (g being acceleration due to gravity)
7.6	**Air Quality**	Atmosphere polluted with industrial gases and wastes because of proximity to industrial area.

3.0 Scope of Work

The scope of this specification covers all the technical requirement with all accessories, tools and tackles of Design, Engineering, Supply, Insurance, Testing at Manufacturer's works, packing, forwarding, Transportation, Delivery at site, unloading at site/stores Installation, Testing & Commissioning of DC system and seamless integration with Purchaser's RTU and other systems for the 33/11kV Primary substation, Warranty support as per the detailed specifications.

Any item though not specifically mentioned but is required to complete the project shall be considered and the same shall be supplied and installed by the bidder.

The indicative Bill of Material is attached with this document for bidder's reference and for bid purpose only ***(Refer Annexure-4 of Section-E, Indicative Bill of Material for Proposed DC System for 33/11kV Primary System).*** Attached BOM is indicative, Bidder shall submit the detailed BOM along with the offer, as per the System offered to meet the specified requirements.

The project is proposed to be implemented in phases as mentioned below:

Phase 1 (FY'21-22): *Scope of work as mentioned for 22 Nos. of Substations (**Refer Annexure-1 of Section-E** Phase-1 (FY'21-22) for Sub-Station details).*

Phase 2 (FY'22-23): *Scope of work* as *mentioned for 67 Nos. of Substations (**Refer Annexure-1 of Section-E** Phase-2 (FY'22-23) for Sub-Station details).*

Phase 3 (FY'23-24): *Scope of work as* mentioned *for 90 Nos. of Substations (**Refer Annexure-1 of Section-E** Phase-3 (FY'23-24) for Sub-Station details).*

Bidder to note that delivery of the system for each phase will be as per the project execution plan, delivery of the system will also be in phased manner. Separate order will be placed for Phase # 3 after completion of Phase 1 & 2. Purchaser will reserve the right to place the order of Phase # 3 to the same bidder or different bidder or may refloat the RFP after the completion of Phase # 1 & 2.

3.1 General

a. It is in the interest of the bidder to visit the sites on sample basis, at his own cost, to assess the requirements before bidding for the project.

After the placement of the award, the bidder shall carry out site survey of all Substations, to collect the required information for completion of detailed engineering. Bidder to note that any

addition of the quantity required for sites during detailed engineering, will be in the scope of the bidder, with no commercial implication to TPCODL.

b. ***No Hardware & Software shall be manufactured, delivered, customized exclusively for this project/contract.***

3.2 **Engineering**

a. Based on the Site Survey, bidder to finalize the substation wise scope of work for installation and Commissioning of DC system.

b. Finalization of Functional Design Specifications, Substation-wise control room layout for DC System, GTP, Schematic Diagrams of DC Panel, Cable Requirement, Preparation of Interconnecting Schedule (Field, Communication, Inter/Intra Panel) and Layout finalization for installation of Panels, Cable route etc.

- Space available in the control room shall be utilized to house the DC System. Bidder to ensure optimal utilization of space to accommodate the DC System.

3.3 **Installation & Commissioning**

3.3.1 **DC System**

a. Supply and installation of DC System shall be in the scope of the Bidder.

b. Extension of AC supply to the DC System and extension of DC output to DCDB shall be in scope of the bidder.

c. Bidder to consider new DCDB to meet all power supply requirement of Primary Substation etc. The new DCDB shall have independent feeders for each application.

d. DC System (Station Battery and Battery Charger) shall be equipped with a controller which can communicate over Modbus RTU protocol. The Bidder must do necessary arrangement to communicate the same with the purchaser's RTU system.

e. The Bidder has to dismantle the existing DC System (Station Battery and Battery Charger, DC Wiring) by the proposed one.

f. Providing proper earthing of DC System shall be in the scope of the Bidder.

g. Appropriate civil work shall be carried out before installation of DC System. Nuts and bolts shall be properly fastened to fix the panel on the floor.

h. Supplying, Laying and Termination of auxiliary power supply cable for extending 24V DC inputs from DCDB to the RTU.

3.4 **Communication & Integration**

a. Communication and Configuration of the DC Systems controller as per RFP shall be carried out by the Bidder followed by local testing, FAT and SAT.

b. DC system (DC controller) configuration shall be tested complete in all respect so that integration testing shall be carried out smoothly without any technical issues during point-to-point testing with Purchaser's RTU Systems.

3.5 **Safety**

a. Bidder to adhere the safety guidelines and policy of TPCODL. Bidder shall refer the Safety document attached with the bid document.

3.6 **Documentation, Backup**

a. Bidder shall provide all documentation in soft / hard form and licensing information for the system supplied ***(Please refer Section D, Drawings & Documents)***

b. The Documents shall be submitted as proposed. Master Document List (MDL) shall be prepared by Bidder and submitted for Purchaser's approval.

c. The bidder shall provide complete engineering data, drawings, reports, manuals and services offered etc. i.e. complete set of documentation / drawings / Circuit Diagram/ Inter-Operability Tables (IOTs) submission of Test Reports, job progress reports etc.

d. It is the responsibility of the Bidder to handover all project related drawings in AutoCAD formats only. The pdf version of above drawings / documents shall also be submitted for formal approval process.

e. Submission of technical documentation related to design, installation, testing, operation & maintenance of the equipment and submission of Test Reports, job progress reports etc. in hard copies (3 sets) and soft copies (3 sets, preferably in PDF).

3.7 **Training**

a. Training of Purchaser's Personnel at site with all required training setup for each individual trainee. ***(Please refer Section A, Item 15.0 for Training requirement)***

3.8 **Mandatory & Recommended Spares**

a. Supply of recommended and mandatory spares for all supplied items (***(Please refer Section A, Item 17.0 for Spares Requirement)*** as mentioned in the separate section

Bidder shall refer the entire project specifications of the RFP to understand the execution methodology, supply, services and interface requirement for complete Scope of work of this project.

It is not the intent of this specification to specify completely herein, all details of design & construction of DC System. It is the bidder's responsibility to complete the installation and commissioning of the system as per the functional requirement mentioned in the RFP.

It is not the intent of this specification to specify completely herein, all details of design & construction of the proposed System. However, the bidder is encouraged to provide latest hardware and software used worldwide to meet the specified requirement and at the same time system shall conform in all respects to high standards of engineering, design & workmanship.

4.0 Terminal Points

4.1 **Bidder**

4.1.1 Site Survey, Scope finalization, Engineering, Layout, ICS and other documents Substation wise covering all the functional requirement envisaged by the Purchaser and documented in the RFP.

4.1.2 Supply of the required material including cables, erection, installation, cable laying & termination, FAT, pre-SAT testing, SAT and demonstration of the required performance is the sole responsibility of the bidder.

4.1.3 Provision of the required power supply from ACDB to DCDB. It is the bidder's responsibility to lay the required cable up to the equipment supplied by bidder.

4.1.4 Integration of DC system Controller with Purchaser's RTU System as specified in the specifications.

4.1.5 Bidder shall depute adequate trained manpower, resources and material to complete the project as per the schedule mentioned in the RFP. If Purchaser feels that the adequate resources and material are not provided, reserves the right to ask the bidder to supply the required material and depute additional resources to complete the project in time.

4.1.6 There shall be only one point of contact for Purchaser, i.e. the bidder who will be awarded the contract will be responsible for delivering the project solely. Any Sub-Contracting of any part of the work will be the responsibility of the lead Bidder as specified by Purchaser.

4.1.7 All application software, hardware, data, plans, drawings, specifications, designs, reports and other documents procured by the selected Bidder in the execution of the contract shall remain the property of the Purchaser, right from the beginning of the contract, during the whole duration of the project and after the expiry or termination of the contract. Purchaser shall also remain the sole owner of the property (Hardware/software) in case the contract is terminated for any other reason.

4.1.8 Any deviation from this RFP / Technical Specification or as per the requirement of Purchaser, if noticed, may be brought forth in the Bid offer / pre-bid meeting / meeting before award of contract. Any such deviation, if informed thereafter bidder will supply Hardware and Software as per the site and functional requirement free of cost to the Purchaser. The decision of Purchaser will be final.

4.1.9 All the approved materials shall be procured and delivered after taking prior approval of Purchaser for each consignment. However, if any change in the quantity of the material, there should not be any additional cost to the purchaser.

4.1.10 Engineering and technical assistance during the contract and warranty and maintenance period.

4.1.11 Provide a Quality Assurance Plan and access to the manufacturing process.

4.1.12 The bidder shall provide all additional equipment and services required to ensure compatibility with Purchaser's requirement.

4.1.13 The bidder shall demonstrate a specified level of performance of the offered system during FAT and SAT.

4.1.14 Bidder shall submit the project plan with major milestone prior to the start of the execution of the project

4.2 **Purchaser**

4.2.1 Will assist the bidder to provide the necessary work permits for working in operational area

4.2.2 Providing all the necessary data regarding the electrical network

4.2.3 Providing details of the existing systems for specified integration

4.2.4 Review and approval of the Bidder's designs, drawings, and recommendations

4.2.5 Review and approval of test procedures

4.2.6 Participation in and approval of "Type", factory and site acceptance tests

4.2.7 Review and approval of training plans.

4.2.8 Coordination of the Bidder's activities with the Purchaser's concerned departments

5.0 Exclusions

The Bidder shall be responsible for providing all the hardware and software, DC System Engineering /Configuration and services required for commissioning of project except mentioned below

5.1 Buildings

5.2 Air Conditioning

5.3 Fire Fighting/Detection system

But Bidder must indicate the optimal space requirements for panels/equipment being supplied under this project which can be installed in the available space as per the space availability at each site.

6.0 Instruction to Bidders

6.1 Bidder Confidentiality

All information contained in this specification is confidential and shall not be disclosed, published or advertised in any manner without written authorization from Purchaser, includes all bidding information submitted. All specification, data and documents submitted by bidder remain the property of Purchaser and all bidders are required to return these documents to Purchaser upon request. Bidders who do not honor these confidentiality provisions will be excluded from participating in future bidding events.

6.1.1 Information relating to the examination, clarification, evaluation and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process. Any effort by a Bidder to influence the Purchaser's processing of Bids or award decisions may result in the rejection of the Bidder's Bid.

6.1.2 Prior to the detailed evaluation, Purchaser will determine the substantial responsiveness of each Bid to the Bidding Documents including production capability and acceptable quality of the Goods offered. A substantially responsive Bid is one, which conforms to all the terms and conditions of the Bidding Documents without material deviation.

6.1.3 Bid determined as not substantially responsive will be rejected by the Purchaser and/or the Purchaser and may not subsequently be made responsive by the Bidder by correction of the non-conformity.

6.1.4 The Bid prepared by the Bidder, and all correspondence and documents relating to the Bid exchanged by the Bidder and the Purchaser, shall be written in the English Language. Any printed literature furnished by the Bidder may be written in another Language, provided that this literature is accompanied by an English translation, in which case, for purposes of interpretation of the Bid, the English translation shall govern.

6.1.5 Bidders shall quote for the entire Scope of Supply / work with a break up of prices for individual items and Taxes & duties. The total bid price shall also cover all the Bidder's mentioned in or obligations mentioned in or reasonably to be inferred from the bidding documents in respect of Design, Supply, Transportation to site, all in accordance with the requirement of bidding documents. The bidder shall complete the appropriate Price Schedules included herein, stating the Unit Price for each item & total price with taxes, duties & freight up to destination at various sites of Purchaser. The prices offered shall be inclusive of all costs as well as Duties, Taxes and Levies paid or payable during the execution of the supply work, breakup of price constituents.

6.1.6 The quantity breaks up shown else-where in Price Schedule is tentative. The bidder shall ascertain himself regarding material required for completeness of the entire work. Any items not indicated but are required to complete the job, shall be deemed to be included in prices quoted.

6.1.7 The bidder is not allowed to modify or withdraw its bid after the Bid's submission.

6.1.8 The Bidder and its Sub-Vendor shall be responsible jointly and severally for the design, supply, erection, commissioning & satisfactory performance of the supplied system and specified Warranty, Maintenance Activities, and support. The Bidder and its Sub-Vendor shall have full facilities for design, Supply, erection, commissioning, system integration, factory and site acceptance test, satisfactory performance of supplied system and specified warranty maintenance.

6.1.9 In case of agreement dishonored by any party (Bidder/ Sub-Vendor), during life of the delivered system, Bidder shall be responsible for providing the services to the Purchaser. Bidder/ Sub-Vendor shall submit the address and contact details of their key account holder.

6.1.10 The Bidder shall give an undertaking to provide full range of services (including hardware and software maintenance, modifications and upgrade support) for the life of the delivered DC system and other sub-vendor equipment and services.

6.2 **Type Tests Reports**

The type tests specified in Purchaser specifications should have been carried out within five years prior to the date of opening of technical bids and test reports are to be submitted along with the bids. If type tests carried out are not within the five years prior to the date of bidding, the bidder will arrange to carry out type tests specified, at his cost. The decision to accept/ reject such bids rests with Purchaser. Type test reports should be issued by third party government accredited laboratory or internationally recognized laboratory like CPRI / ERDA / KEMA / International Accredited Lab.

6.3 **Technical Clarifications**

TPCODL do not entertain any deviation on the project specifications. The bidder should submit declaration on no deviation. However, if there are any deviations the Bidder should bring in notice of the Purchaser with proper documentations justifying the deviation. The Purchaser will take a call after going through the document and the decision of the Purchaser will be final. No explanation shall be provided to the Bidder for that. After scrutiny of qualifying criteria, technical commercial criteria offered by the bidder, clarifications will be sought from the bidders for any deviations with respect to the Purchaser specifications and attempt will be made to bring all bids on a common platform.

6.4 **Bid Evaluation Criteria / Bid Selection / Bid Award Decision**

6.4.1 The decision to place purchase order/LOI solely depends on Purchaser on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity. In addition to other factors that Purchaser may deem relevant.

6.4.2 Purchaser reserves all the rights to award the contract to one or more bidders to meet the delivery requirement and timely project completion or nullify the award decision without any reason.

6.4.3 In case any Bidder is found unsatisfactory during the delivery process, the award will be cancelled and penalized for non-execution of the project in time. In addition, the Purchaser may downgrade the rating of the Bidder which will affect the future businesses/opportunities with TPCODL.

6.5 **Climate Change and Waste Management**

Significant quantities of waste are generated during the execution of project and an integrated approach for effective handling, storage, transportation, and disposal of the same shall be adopted. This would ensure the minimization of environmental and social impact in order to combat the climate change.

It is bidder's responsibility to transport and shift all the waste material generated to Purchaser's designated location for further disposal/processing.

6.6 **Ethics Policies, Mandates and Considerations**

Purchaser is an ethical organization and as a policy Purchaser lays emphasis on ethical practices across its entire domain. Bidder should ensure that they should abide by all the ethical norms and in no form either directly or indirectly be involved in unethical practice. Bidder is advised to refer GCC attached for more information.

6.7 **Safety Considerations**

Safety related requirements as mentioned in our safety Manual. All Associates shall strictly abide by the guidelines provided in the safety manual at all relevant stages during the contract period. Bidder is advised to refer GCC attached for more information.

a. All the equipment shall be as per IEC / IS standards.

b. As the work must be carried out in operational area, necessary work permit shall be prepared and approved from authorized persons.

c. While working on site, use of PPE (personal protective equipment) is mandatory.

d. Installation and commissioning of equipment, laying of cables activities shall be done by adequately trained persons with proper procedure including required outages of equipment/system.

e. Bidder shall furnish operating and maintenance manuals clearly bringing out safety aspects of equipment.

f. Bidder's all site persons have to go through Safety Training at Purchaser's site

g. Bidder to depute Safety officer, to ensure the activities at site during installation and commissioning of the system as per Purchaser's safety policy and procedures.

h. The Bidder's safety officer shall work along with Purchaser's Safety officer as per the policies and requirement stated in the Safety document.

6.8 Bidder's Technical and Commercial Proposal

6.8.1 General Guideline

a. Purchaser will select the 'bidder' in accordance with the eligibility criteria indicated in **Item 8.0** of this document.

b. The bidders are invited to submit a Technical Proposal and a Commercial Proposal for goods and related services required for the project as defined in RFP. This proposal will be the basis for finalization of the contract with the successful bidder.

c. The bidders must familiarize themselves with local conditions and take these into account while preparing their proposals. To facilitate the bidders in making the Proposal, the Purchaser shall have a 'Pre-Bid Discussion/meeting as per the schedule mentioned in RFP.

d. Please note that costs involved in preparation of the proposal and of negotiating the contract, including a visit to the Purchaser, are not reimbursable.

e. Bid prices shall be quoted in Indian Rupees only.

6.9 Risk & Mitigation Planning

Bidder shall assess underlying risks in implementation of the Project and detail out the methodology to mitigate them. It may include development of a risk assessment matrix indicating severity of the risk, chance of its occurrence and its mitigation approach.

7.0 Codes and Standards Applicable

The design, manufacture and performance of the DC System shall comply with all the requirements of the latest editions of international codes and standards applicable. Nothing in this specification shall be construed to relieve the Bidder of this responsibility.

Emissions Standards		
1	EN55011 (CISPR 11)	ISM RF Equipment – Electromagnetic Disturbance Characteristics
2	60255-25	Electromagnetic emission tests for measuring relays and protection equipment
3	61000-3-2:2000	EMC-Limits for harmonic current Emissions.
4	61000-3-3:1994+2001	EMC Limits-Limitations in voltage changes, voltage fluctuations and flicker in public low-voltage supply systems.
Immunity Standards		
1	61000-4-2 1995-01 60255-22-2 IEEE C37.90.3	Electrostatic discharge (ESD) immunity test
2	61000-4-3 1998-11 60255-22-3 IEEE C37.90.2 (10V/m)	Radiated, radio-frequency electromagnetic field immunity test
3	61000-4-4 1995-01 60255-22-4 IEEE C37.90.1	Electrical fast transient/burst immunity test
4	61000-4-5 1995-02	Surge immunity test
5	61000-4-6 1996-03	Immunity to conducted disturbances, induced by radio-frequency fields
6	60255-22-6	Electrical fast transient/burst immunity test
7	61000-4-81993-06	Immunity to power frequency magnetic fields
8	61000-4-12	Oscillatory waves immunity test
9	1995-05 60255-22-1 IEEE C37.90.1	(Damped Oscillatory and Ring wave)
Safety		
1	61010-1	Harmonized Safety Standard
2	60255-5 2000-12	Insulation coordination for measuring relays and protection equipment- Requirements and tests

Power Supply Standards		
1	61000-4-11 1994-06	AC Power supply interruptions
2	61000-4-16 1998-01	Immunity to conducted, common mode disturbances.
3	61000-4-17	Ripple on D.C. power supply
4	61000-4-29+ 2000-08 60255-11	Voltage dips, short interruptions & voltage variations on D.C. input power port immunity test
Environmental Standards		
1	60068-2-1 1994-05	Environmental Testing Cold
2	600068-2-2 1974	Environmental Testing Dry Heat
3	60068-2-6 1995-03 60255-21-1	Environmental Testing Vibration tests (sinusoidal)
4	60068-2-27 1987	Environmental Testing Shock
5	60068-2-29 1987	Environmental Testing Bump
6	60068-2-30 1980	Environmental Damp Heat cyclic (12+12 hour cycle)
7	60068-2-31 1969	Environmental Testing Drop and Topple
8	60255-21-2	Shock and bump tests
9	IEC 61850-3	Substation Environment Requirement
Communication Standards		
1	IEC 61850-5 to 10 IEEE 802.3 CSMA/CD	Substation Comm. Standard access method and physical layer specifications
Other Applicable Standards		
1	IS 9000	Basic Environmental testing procedure for electrical and electronic items
2	IS 694-1990	PVC insulated cables for working voltage up to and including 1100V
3	IS 2629-1985	Recommended practice for Hot Dip Galvanizing of iron & Steel.
4	IS 2633-1986	Test for uniformity of Zinc Coating
5	IEC 60529	Degrees of Protection provided by enclosures (IP Code)
6	IEC 62052-11	Electricity metering equipment (a.c.) – General requirements, tests & test conditions
7	IEC 62053-22	Static meter for active energy (Class 0.2S and 0.5S)

Wherever, new standards and revisions are issued during the period of the contract, the Bidder shall attempt to comply with such standards, provided there is no additional financial implication to Purchaser.

In the event of the bidder offers to supply material and/or equipment in compliance to any standard other than those listed herein, the bidder shall include with their proposal, full salient characteristics of the new standard for comparison.

8.0 Bidder's Qualification Requirement, Experience and Bid Evaluation Criteria

8.1 Bidder's Qualification Requirement

8.1.1 The bidder should be a firm registered/incorporated under Companies Act, 1956 or Companies Act, 2013, and further amendment (s) (Photocopy of Certificate of Incorporation issued by the Registrar of Companies).

OR

a registered partnership firm (registered under section 59 of the Partnership Act, 1932),

(Of registered Partnership Deed)

OR

a limited liability partnership (under the Limited Liability Partnership Act, 2002), (of the LLP Registration Certificate issued by Registrar of Companies)

OR

a Proprietorship firms.

("of Certificate/license issued by municipal authorities under Shop & Establishment Act. Or

Complete ITR (including computation of income) in the name of Proprietor. Or Relevant documents issued by Central/State Government authority/department etc.)

8.1.2 The bidder should have demonstrable experience, from among either of the following, of having successfully executed similar works during last Three (03) years ending on the last day of the month previous to the one in which the Tender is issued, i.e.,

a. Three similar completed works, each valued not less than Rs. 1.53 Crores.

OR

b. Two similar completed works, each valued not less than Rs. 2.30 Crores The Bidder/Principal/Consortium shall be the Original Equipment Manufacturer for Hardware and Software of the proposed Sub-Station Automation System.

OR

c. One similar completed work valued not less than Rs. 4.60 Crores.

Relevant documentary proof – Copy of Purchase Order/Letter of Award/Contract/Work Order, with proof of completion in the form of Completion Certificate/Payment Advice/Client's Letter regarding release of Security Deposit/CPG on successful completion of Order, etc.

8.1.3 Bidder should have service/sales/distribution network/office in the area covered under this tender to ensure minimum response time. Undertaking on company letterhead for the same with details of distribution/sales/service network.

8.1.4 In case bidder uses experience of OEM to meet the QR, then bidder shall submit concurrence from the OEM to support the supply and experience criteria.

8.1.5 The Bidder/OEM should not be black listed by any Central / State Government / Public Sector Undertaking in India. Undertaking on company letterhead for the same with details of distribution/sales/service network

Bidders/OEM need to submit the details as per the attached format with RFP and ensure that the documents submitted are clearly marked/bundled in support of above-mentioned qualification criteria. In absence of these reference documents, the Purchaser will not further evaluate the bid and/or the Bidder for any correction of the non-conformity may not subsequently make the Purchaser responsive.

8.1.6 The bidder shall submit Type test reports obtained from CPRI / ERDA / KEMA / International Accredited Lab for the offered solution. The type tests should have been conducted on the equipment / material of the same design.

8.1.7 In case the type test reports furnished are not for the offered equipment / material but for the equipment / material with and/or different capacity, then type test shall be carried out for the offered equipment / material from CPRI / ERDA / KEMA / International Accredited Lab without any cost implication to the Purchaser and the Type Test reports shall be submitted before dispatch of the equipment / material.

8.1.8 Equipment, Spare Support and Availability of the proposed system will be for the period of minimum 10 years.

8.2 **Bidder's Project Experience**

8.2.1 Bidder shall provide details of projects and other requirements Eligibility Criteria which have been successfully completed during the last 5 financial years. Please do not supply the names of clients who are no longer using your product/system. Bidders need to submit the details as per the format in the table provided and necessary supporting documents should be attached with RFP:

Sl. No.	Name of the Project	Client Name and Contact Details	Whether the Project was successfully commissioned	Date and Year of Commissioning	Value of the Project	Indicate the DC System with Controller implemented in the project	Indicate the protocol implemented viz IEC60870-5-101/104, IEC61850, Modbus (IP, Serial)

Table: Details of Project Experience

Note: Kindly provide Client Performance Certificates for the completed projects provided for establishing/confirming the requisite details for project experience as mentioned above Or Copy of LoA/ Work Order along with proof of release of final payment.

8.2.2 The Bidder should have at least 5 Commissioning engineer on its roles with a minimum experience of 5 years on Substation DC system to support parallel activities of the Purchaser. Signed resume of employees authenticated & signed by the bidder needs to be submitted. Scanned signatures of the employees shall be accepted.

8.2.3 Bidder shall agree to comply with minimum quality requirements and Contractor Safety Code of Conduct, defined in bid documents.

8.2.4 Bidder must agree for handing over, to Purchaser, all project related drawings in AutoCAD format only. The pdf versions of above drawings shall be submitted for formal approval process.

8.2.5 Bidder shall submit the acceptance of TPCODL's preferred list of Vendor / Sub Vendor / OEM, which is shared as part of Technical Specifications and the same shall be acceptable to the bidder. ***(Refer Annexure-6 of Section-E, Preferred/Approved make of Equipment/System).***

8.2.6 Bidder shall confirm the equipment and Spare Support and Availability for the period of 10 years. Bidder shall submit each equipment product life cycle details along with the technical proposal (for Own and Sub Vendor Equipment).

8.3 **Bid Evaluation Criteria**

8.3.1 The Bids will be evaluated technically (in terms of quality, technical merit, functional characteristics, schedule, after-sales service, local support in India and technical back-up). The technical merits and quality and functional characteristics of the offered equipment and work will be evaluated in terms of its ability to meet specific technical requirements included in the Contract Documents. The Bidder shall therefore be prepared to submit at the request of Purchaser adequate information or Work meets the intent of the technical requirements.

8.3.2 Purchaser shall be fully entitled to adopt whatever means it deem fit to evaluate the bids at its sole discretion, which shall not be questioned by the bidder under any circumstances whatsoever.

8.3.3 The evaluation team will thoroughly review the proposals submitted by various bidders. The broad technical evaluation will be based as below

a. Technical Proposal: 100% Weight

b. Pre-bid meetings will be conducted with all the bidders

Minimum qualification mark for technical score as mentioned in the RFP shall be 75 out of 100.

8.3.4 **Technical Evaluation**

The technical bid has a weightage of 100%. Technical evaluation will happen in two stages.

a. **Stage-1:** Preliminary Evaluation

In Stage-1, the following shall be confirmed: Deviations, Acceptance of terms and conditions, Acceptance to scope of work and compliance to technical specification ***(Scope of work as mentioned in Section A and technical details in Section B)***. In case the bid doesn't meet all the mandatory requirements, the bid shall be termed as non-responsive and will not be evaluated further.

b. **Stage-2**: The distribution of weights for bid-evaluation are as follows

Sl. No.	Description	Weight	
A	Technical Proposal		100

1	Project Experience	40	
2.a	Presence in India	15	
2.b	Presence in Odisha for service support	10	
3	Team Details (CV)	10	
4	Technical Know-How	15	
	Total Marks		**100**

Sl. No.	Description	Max Score
Technical Solution Score		100
1	**Project Experience**	**40**
a)	Number of Substation DC system successfully completed in last 5 years. Similar to Technical Requirements as per the specification • 15 marks shall be awarded for a single project meeting the functionality as mentioned in the QR. • In case multiple projects are submitted, 3 marks shall be awarded for each project subject to a ceiling of 15 marks. Satisfactory performance certificates of the running projects.	15
b)	Project experience in implementation of Substation DC system having similar solution Bidder having experience in satisfying the following criteria: • Execution of DC system in 33/11kV Primary substations (4 Marks) • DC system integration with RTUs/Automation system. (3 marks) • Experience on dismantling existing DC system with new DC system (Preference to be given to the Bidder who executed with less outage time in each substation) (5 marks) • DC Controller support protocol IEC61850 (3 marks) • Controller shall be standalone and replaceable on failure. (3 marks) • The DC Charger shall have replaceable Rectifier Unit. (3 marks) • Bidder providing warranty of batteries more than 5 years (4 marks) The bidder shall be awarded marks indicated for satisfying the above criteria in one project or multiple projects put together. For satisfying of single criteria, only indicated marks shall be awarded, irrespective of its implementation in number of projects.	25
2.a	**Presence in India** i) Manufacturing in India as an initiative of Government of India "Make in India"; 7 Marks ii) The bidder with design / Engineering / Testing / Installation /	15

	Commissioning / Maintenance / Patch Management / Timely Upgradation facility in house (In India) as on date of release of RFP; 8 Marks	
2.b	Availability of service support in Odisha	10
3	**Team Details (CVs)**	20
	Experience minimum 5 years in area of Substation DC Systems engineering and commissioning. For submission of CV, 2 mark shall be awarded per CV subject to ceiling of 10 marks that can be obtained in this category.	10

Sl. No.	Description of Technical Know-How	Max Score
Technical Know-How: The Bidder is expected to satisfy the following criteria for the Substation DC Systems:		25 marks
a)	Proposed product should be under life cycle growth (latest and having a life span under production for minimum next 10 years) as per Life Cycle of the product.	6 marks
b)	Battery Charger have earth fault and over current features	3 marks
c)	Battery Charger has soft start feature	3 marks
d)	Battery Charger has current limit facility	3 marks
e)	Parallel redundant float and boost charger	3 marks
f)	Battery Charger & Controller has conformal coating	7 marks

8.3.5 The bids will be evaluated technically on the compliance to specification terms and conditions as detailed in the various sections of the document.

8.3.6 Bidder must mandatorily quote against each item as per the functional requirement and of indicative bill of material.

8.3.7 Bidder must comply with Qualification requirement and compliance sheet.

8.3.8 Bidder must submit the list of sites and contact details in which similar solution have been developed and successfully running its operation. Purchaser team reserves the right to visit those sites and bidder shall facilitate such visit.

8.3.9 Bidders shall quote for all items specified and all the sub items in the specified format. Bids not complying with this requirement shall be liable for rejection. All bids and combination of bids shall be opened and evaluated simultaneously so as to determine the bid combination offering the most advantageous solution for the Purchaser.

8.3.10 The evaluation shall be made primarily on technical parameters and also the overall cost of the items and quantities mentioned in the schedule of quantities. However, while placing the

order, or during the execution, the Purchaser reserves the right to modify the quantities of individual items.

9.0 Project Schedule / Calendar of Events / Milestones

a. The Bidder shall provide a detailed Implementation Schedule indicating major Bidder and Purchaser activities, major completion milestone events, and interdependencies between events. Required Purchaser activities and associated dates must be clearly shown and include interdependencies to the Bidder's scheduled activities. The schedule shall be in terms of months after Receipt of Order (ARO), not absolute dates.

b. The Bidder shall perform all scheduling activities with Microsoft Project/any standard software, such that all schedules as periodically transmitted to Purchaser include both hard copy and electronic versions.

c. Following is the expected delivery schedule.

9.1 Delivery Schedule (Phase # 1, Phase # 2)

9.1.1 For Phase-1 FY'21-22

Sr. No.	Milestone	Target
1	PO Placement	Zero Day
2	MDL & Project Detailed, Project Execution Schedule submission & approval	Within 5 days from Sr. No. 1
3	Circuit Diagram, Scheme drawing and other Drawings, Bill of Material finalization, Functional and Design Specifications (FDS), FAT & SAT documents submission & approval	Within 7 days from Sr. No. 1
4	Procurement of DC System	Within 30 days from Sr. No.3
5	Inspection of equipment (FAT)	Within 5 days from Sr. No. 4
6	Delivery of DC System	Within 10 days from Sr. No. 5
7	Completion of installation of DC system, cable laying, termination	Within 10 days from Sr. No. 6
8	Pre-SAT Testing	Within 10 days from Sr. No. 6
9	Commissioning, Integration Testing & SAT	Within 18 days from Sr. No. 8
10	Resolving punch points and demonstration to Purchaser	Within 5 days from Sr. No. 9
11	Project closure after resolving of Punch points submission of documents and Software licenses	After 5 days from Sr. No. 10
12	Overall project schedule	90 days

9.1.2 For Phase-2 FY'22-23

Sr. No.	Milestone	Target
1	Review and Resubmission of Project Execution Schedule for approval	Zero Day from Project Closure of Phase # 1
2	Architecture and other Drawings, Bill of Material finalization, Functional and Design Specifications (FDS), FAT & SAT documents submission & approval	Within 10 days from Sr. No. 4 of Phase # 1
3	Procurement of DC system	Within 30 days from Sr. No. 2
4	Inspection of equipment (FAT)	Within 15 days from Sr. No. 3

5	Delivery of RTU Panel and other System	Within 15 days from Sr. No. 4
6	• Completion of installation of DC system, cable laying, termination etc. • Pre-SAT Testing • Commissioning & Integration Testing • Resolving punch points and demonstration to Purchaser	Within 30 days from Sr. No. 5
7	Project closure after resolving of Punch points submission of documents and Software licenses	After 15 days from Sr. No. 6
8	Overall project schedule	153 days

Commissioning Schedule for Phase # 3 will start after the completion of Phase # 2 and from the day of order placement. Milestone of Phase # 3 will be same as of Phase # 2. Expected completion of Phase#3 is March'24.

9.2 Calendar of Events

Sr. No.	Events	Target
1	Detailed bid documents / hosting of detailed bid documents in Purchaser's ARIBA website	Zero Date
2	Pre-Bid Meeting with Bidders	Within 5 days from Sr. No. 1
3	Site visits by Bidder	Within 5 days from Sr. No. 1
3	Receipt of pre-bid queries, if any	Within 5 days from Sr. No. 1
4	Posting of Consolidated replies for the pre-bid queries to all bidders	Within 2 days from Sr. No. 3
5	Receipt of Bids	Within 5 days from Sr. No. 4
6	Opening of technical bids	Next working day from Sr. No. 5
7	Date & Time of opening of Price of qualified bids	Will be notified to the successful bidders through our website / mail.

9.3 Payment Mile Stones

Payment shall be made as per the finalized payment terms with Purchaser's procurement team as per the milestones mentioned below:

- 60% release of payment on supply of material
- 40% release of payment on complete ITC

All payments to the bidder will be released within 30 days of invoice date, after certification from TPCODL.

10.0 Submissions by Bidders

10.1 Mandatory Documents required along with the Bid

Bidders are requested to submit their offer in line with this bid document. Purchaser shall respond to the clarification raised by various bidders and the replies will be sent to all participating bidders through ARIBA.

Bidder shall submit the document as specified in ***Section-D*** and as described in various section of this document.

The technical bid shall be properly indexed and is to be submitted in Soft Copy and three nos. Hard Copy.

10.2 Departure from Specifications

Bidder shall necessarily submit a signed and stamped copy of this BID (in original) as a token of acceptance of all the terms and conditions of this BID. Replication of this BID on bidders' document shall not be acceptable. Normally no deviation is accepted to BID document supplied with the bid & bid with deviation is liable to be rejected. However, in case of any deviations to this BID, all such deviations shall be furnished by the bidders in the Schedule of Deviations attached as Section-C, Item-C3, and submit the same as a part of the Technical Bid.

10.3 Right of Acceptance / Rejection of Technical Proposal

Bids would be rejected in absence of following documents:

a. Details required for PQR not submitted

b. Complete technical details are not enclosed

c. The offer does not contain un-priced detailed Bill of Material as per the RFP

d. Bid is received after due date and time

e. False Information / Details

Purchaser reserves the right to accept/reject any or all the bids without assigning any reason thereof.

10.4 **Documentation & Licenses**

Bidder shall submit the documents as per ***Section D*** for bid submission and Post Award. Bidder to ensure that software procured shall be perpetual license in the name of the Purchaser.

11.0 Project Management

11.1 **Project Implementation**

This section specifies project implementation requirements, including Purchaser and the Bidder responsibilities, project management procedures, project documents, the activities leading up to shipment of the DC System, installation, commissioning, and site test activities.

11.2 **Project Management**

The Bidder and Purchaser shall assign a project manager with the authority to make commitments and decisions that are binding on the either side with the following responsibilities:

11.2.1 **Purchaser's Project Manager**

Purchaser’s project manager shall be responsible for representing Purchaser’s interests throughout the project. Purchaser’s project manager will, from time to time, authorize other staff to act in this regard for specific tasks. The project manager will also change such assignments from time to time. Such actions shall be submitted to the Bidder in writing.

All correspondence with Purchaser shall be addressed to Purchaser's project manager.

11.2.2 **The Bidder's Project Manager and Project Personnel**

The Bidder shall designate a project manager who shall be responsible for the co-ordination of all project work and for the communications between the Bidder and Purchaser. Except for conditions outside the control of the Bidder, the Bidder's project manager shall not be removed or replaced without the approval of Purchaser.

Bidder shall submit the manpower deployment plan along with the bids. The project shall be staffed with a core project team. Additional personnel shall be assigned to work under the direction of the core team. Core project team members shall have experience as stated elsewhere in this document.

The Bidder shall inform Purchaser of any pending or possible changes in the use or status of all Bidder project personnel. Any changes to Bidder staff, including work assignments and participation level, shall be announced as soon as practical and shall be subject to Purchaser's approval. Purchaser shall have the right to have any Bidder staff removed from the project for cause.

11.3 **Project Management Practices**

Bidder shall provide high-level details of the project management practices that will be followed to manage the project. The project management practices would include (but not be limited to) details of:

a. Bidder must provide details of how they envisage the contract being managed and control mechanisms; regular and active review meetings; Project management of individual work streams and overall program management of the entire service; Performance reporting

b. Bidder should outline their proposed governance structure and designate a Service Manager to co- ordinate their activities and provide a focal point of contact to which Purchaser can refer on any matter concerning the service.

c. Reporting lines and decision-making powers within the bidder's organization must be submitted

d. Reporting formats and templates that would be followed by the bidders

e. Outline the proposed escalation procedures if issues arise.

11.4 **Project Schedule**

The project should be implemented as per the prescribed schedule. Based upon this schedule the bidder shall submit a preliminary implementation plan along with the bid. The detail project implementation schedule shall be submitted by the bidder after award for Purchaser's approval, which shall include at least the following activities:

a. Site Survey

b. Document submission and approval schedule

c. Factory & Site Testing Schedule

d. Hardware purchase & Manufacturing, Software development & integration schedule

e. Dispatch Schedule

f. Installation / commissioning schedule

g. Training schedule

11.5 **Progress report**

A progress report shall be prepared by the Bidder each fortnightly against the activities listed in the project schedule. The report shall be made available to Purchaser on a fortnightly basis. The progress report shall include all the completed, ongoing and scheduled activities.

11.6 **Transmittals**

Every document, mail, letter, progress report, change order, and any other written transmissions exchanged between the Bidder and Purchaser shall be assigned a unique transmittal number. The Bidder shall maintain a correspondence index and assign transmittal numbers consecutively for all Bidder documents. Purchaser will maintain a similar correspondence numbering scheme identifying documents and correspondence that Purchaser initiates.

11.7 **Implementation Responsibilities**

The general responsibilities of Purchaser and the Bidder are presented below. Other sections in the Specification may also present responsibilities. If the requirements of any other sections conflict with the responsibilities of this section, the responsibilities of the other sections shall take precedence over this section.

11.7.1 **Bidder's Responsibilities**

The Bidder's specific responsibilities shall include:

a. Providing all DC System equipment and related support materials

b. Defining the stock of spare parts during commissioning and to maintain the system availability during Warranty period.

c. Providing all engineering, software design, development, and integration services necessary for DC System

d. Managing, coordinating, and scheduling the activities of all Sub-vendors employed by the Bidder for this project. This shall include the resolution of all problems with the hardware, software, and services.

e. Implementing the DC System according to the quality standards acceptable to Purchaser

f. Training Purchaser staff so that they will be self-sufficient and able to operate, maintain, and upgrade the complete DC System

g. DC System documentation such as instruction manuals, maintenance manuals, drawings, software design and user documentation,

h. Submission of as-built drawings and other documentations

i. Providing adequate facilities and resources of Bidder and Sub-Vendor/OEM during FAT, installation & commissioning and SAT.

j. Providing an environment that allows for reproducible execution of DC System functional performance tests conducted during factory acceptance testing

k. Transportation, delivery and temporary storage of all Bidder-provided equipment and materials to Purchaser's site or sites

l. Performing the installation of DC System at Purchaser's site under Purchaser's supervision

m. Performing after delivery and start-up of the system, but prior to any site testing, setting up all functions for proper operation.

n. Performing the test at Purchaser's site, including correction of observations and reported variances

o. Ensuring and periodically demonstrating that the work is progressing according to the approved schedule

p. Availability of the DC System before handing over and during the Warranty period as per SLA

q. Adherence to all warranty clauses and support after expiry of Warranty period as per the RFP.

11.7.2 **Purchaser's Responsibilities**

Purchaser will be responsible for the following:

a. Providing input raw AC power to equipment enclosures

b. Reviewing and approving project deliverables such as, but not limited to, detailed implementation schedule, software and hardware functional design documents, user manuals, drawings, progress reports, training program, quality assurance plan, test plans and procedures, test results, support services (including maintenance), and as-built system documents

c. Coordinating and supervising the Bidder's work to be performed at Purchaser facilities

d. Attending pre-factory tests (at Purchaser's discretion)

e. Participating in factory tests and approving test results

f. Assist the Bidder as per the site requirement

g. Monitoring the site tests and approving test results

h. Monitoring the availability test and approving test results

i. Reviewing variance reports and approving corrected variances

j. Review of the Bidder's work progress in accordance with the schedule

k. Verification of installation practices, and workmanship conform to requirements of TPCODL's practices

l. Co-ordination for on-site training.

12.0 Quality Requirements, Inspection, Installation, Commissioning and Testing

12.1 Quality Assurance

Quality of service - Bidder must provide details of their proposed approach to quality assurance to ensure the quality of services in accordance with RFP Document. This should include:

a. Responsibility of quality of service.

b. How the bidder will ensure quality service is provided.

c. How quality will be measured

d. Bidder shall submit their quality certification / Assessment document. Bidder shall provide the following information along with the documents.

Description	Bidder's Response
Certification / Assessment Name	
Who issued the Certification / Assessment?	
When was the Certification / Assessment obtained?	
Does this Certification / Assessment process involve periodic reviews and observations / remarks after such review? If so, please provide details and specify when your company is due for its next quality review?	

Table: Details of Certification

All materials and parts of the Bidder's own and Sub-Vendors System / Sub-System to be supplied under this project shall be current, in line with industry standard.

12.1.1 **Quality Assurance and Testing**

To ensure that the Bidder produces a well-engineered and contractually compliant Substation DC Systems, a quality assurance program shall be followed and both structured and unstructured tests shall be performed.

12.1.2 **Quality Assurance Program**

The Bidder must employ documented Quality Assurance (QA) techniques and practices throughout this project. This QA program shall be adhered to for the preparation of all Contract deliverables, including documentation, hardware, firmware and software. The program shall provide for the minimization of defects, the early detection of actual or potential deficiencies, timely and effective corrective action, and a method to track all such deficiencies.

12.2 Inspection

Purchaser shall be allowed access to the Bidder's facilities during system design, manufacturing and testing and to any facility where hardware or software is being produced. The Bidder shall provide office facilities, equipment, and documentation necessary to complete all inspections and to verify that the Substation DC Systems is being fabricated and maintained in accordance with the Specification to Purchaser's representatives.

Purchaser shall be allowed to inspect the Bidder's hardware and software quality assurance standards, procedures, and records. Documents identified in the approved product quality assurance plan will be inspected to verify that the Bidder has performed the required quality assurance activities.

The inspection rights described above shall not apply to sub-bidders supplying standard computer or peripheral equipment and third-party software products. However, inspection rights shall apply to Sub-Vendors that are developing new software, offering solutions for inclusion in the Substation DC Systems.

12.3 Commissioning

12.3.1 **Receipt at site, Handling, Storage & Insurance**

Bidder shall make his own necessary arrangements for storage space for the proposed system.

Delivery and movement of material to site shall be the responsibility of Bidder.

All Insurance including but not restricted to transit, storage, and installation and commissioning till the acceptance of the complete system shall be the responsibility of the Bidder.

12.3.2 **Installation**

Installation of the complete system is under Bidder's scope. Installation work shall be scheduled and carried out in coordination with Purchaser's representatives. All related drawings, installation manuals and recommended practices shall be submitted in advance for Purchaser's approval. Installation shall be certified by the Bidder's representative.

12.3.3 **Cabling Scope (Supply, Laying, Installation and Termination)**

The following shall be in the bidder's scope

a. All cables to and from any equipment supplied by Bidder

b. All cables shall be tagged appropriately, cross ferruling shall be used for identification of the Cable, Inter/Intra Panel wiring.

c. All cables between Purchaser's existing equipments to equipment supplied by the Bidder.

d. Earthing interface and the earth cable of the DC System to the earth pit to be provided by the Bidder

e. Laying of the power cable and communication cables in the control room through existing trenches or with the provision of HDPE pipe is the responsibility of the Bidder.

12.3.4 **Commissioning Activities**

a. The commissioning of the system including SAT and one Month Trouble free operation shall be the responsibility of Bidder.

b. Adequate number of qualified engineers and technicians for multi-site installation and commissioning activities as approved by Purchaser shall be posted at site during the entire period of installation & commissioning for Substation DC Systems.

c. Daily site work shall be planned and executed as per due approvals from Purchaser's representative.

d. Bidder shall submit detailed site organization chart of Personnel for Purchaser's approval. Purchaser reserve the right to review the same. Bidder's commissioning engineers shall also train purchaser's engineers during commissioning apart from scheduled Training.

e. The responsibility for Installation, Commissioning, Performance guarantee and warranty shall remain with the Bidder.

f. The Bidder shall furnish procedures, protocols for commissioning and acceptance test activities.

g. All tools (both hardware and software), test instruments, simulation jigs, documents, programming equipment etc. required for Installation, Testing & Commissioning are in the scope of bidder.

h. All passwords, access keys etc. are the property of the Purchaser and shall be handed over to the Purchaser.

i. Bidder/OEM qualified representatives including specialists shall participate at site for supervision, & certification of commissioning and Acceptance tests.

The Bidder shall comply and adhere to the safety policy of the Purchaser. Hence necessary safety apparels shall be borne and used by Bidder for their personnel at their cost. Also, it is the responsibility of the Bidder to ensure their compliance to statutory requirements of their workmen. All the workmen engaged at the TPCODL site should have necessary ESIC and PF registration.

12.4 Testing

12.4.1 Test Responsibilities

Both Purchaser and the Bidder shall designate, in writing and prior to the start of the factory test, a test coordinator. Each coordinator shall be responsible for ensuring that the tests are conducted in accordance with the requirements of this Contract. The coordinators shall have the authority to make binding commitments such as approvals of test results and scheduling for variance corrections or, as a minimum, to cause such commitments to be expeditiously made.

Unless otherwise stated in this Specification, the Bidder shall be responsible for all factory tests. This responsibility shall include the conduct of the tests and all record keeping and document production. Bidder will support the factory testing by supplying staff to execute the test procedures under the Purchaser's supervision.

12.4.2 Test Documents

Test plans, procedures, and records shall be provided by the Bidder for all tests to ensure that each test is comprehensive and verifies the proper performance of the DC System elements under test. During the development of test plans and test procedures, emphasis shall be placed

on testing each conditional logic statement, checking error conditions, and documenting the simulation techniques used. The test plans and test procedures shall be modular to allow individual test segments to be repeated as necessary.

All test plans and test procedures (standard, modified standard, and custom functions) shall be submitted to Purchaser for approval and shall be subject to the approval process as defined in ***Section-D, Item 2.5 Document Review and Approval.***

12.4.3 **Test Plans**

The test plans shall describe the overall test process, including the responsibilities of individuals and the documentation of the test results. The following shall be included in the test plans:

a. The schedule for the test

b. The responsibilities of Bidder and Purchaser personnel, including record-keeping assignments

c. Any forms to be completed as part of the tests and the instructions for completing the forms

d. Procedures for monitoring, correcting, and testing variances

e. Procedures for controlling and documenting all changes made to the hardware and software after the start of testing

f. Block diagrams of the hardware test configuration, including the Bidder- and Purchaser-Substation DC Systems and any test or simulation hardware.

Test plans shall be provided for the Factory Acceptance Test, Site Acceptance Test, and Availability Test.

12.4.4 **Test Procedures**

The test procedures shall describe the methods and processes to be followed in testing the DC System. The test procedures shall be modularized, such that individual functions of the DC System can be independently tested and so that the testing proceeds in a logical manner. This section uses the term segment to refer to a higher-level part of a test procedure and the term step to refer to the most detailed level of test instruction.

The test procedures shall include the following items:

a. The name of the function to be tested

b. References to the functional, design, user, and any other documents describing the function

c. A list of test segments to be performed and a description of the purpose of each test segment

d. The set-up and conditions for each segment, including descriptions of the test equipment and data to be supplied by the Bidder and by Purchaser.

e. Step-by-step descriptions of each test segment, including the inputs and user actions for each test step

f. Forms for the recording of test results

g. The expected results for each segment, including pass/fail criteria

h. Copies of any certified test data to be used in lieu of testing, if approved by TPCODL.

The Bidder shall note that Purchaser will not accept any certified test data in lieu of testing except where specifically stated in the Contract.

12.4.5 **Test Records**

Complete records of all tests result shall be maintained. The records shall be keyed to the test procedures. The following items shall be included in the test records:

a. Reference to the appropriate test procedure

b. Date of the test

c. Description of any test conditions, input date, or user actions differing from that described in the test procedure

d. Test results for each test segment including a passed/failed indication. All information recorded during the test such as measurements, calculations, or times shall be included in the results.

e. Identification of the Bidder's and Purchaser's representatives performing and witnessing the test

f. Provision for comments by Purchaser's representatives

g. References to all variance reports generated

h. Copies of reports, display copies, and any other hardcopy generated as part of the test.

12.4.6 **Variance Recording and Resolution**

A variance tracking system shall be placed in service immediately after installation and commissioning and shall remain in use through the completion of the warranty. Both the Bidder and Purchaser may initiate variances at any time. Variances may be used to record

system deficiencies at any time, even if the system is not undergoing testing. This variance tracking system shall record and track variances for:

a. Documentation deficiencies

b. Functional deficiencies

c. Performance deficiencies

d. Procedural deficiencies (as when deviations from contractually required QA procedures are observed)

e. Test deficiencies (as when the system cannot satisfactorily complete a test procedure due to a problem with the test).

The variance recording and tracking system shall produce reports of all variance information and shall produce subsets of the variances based on searches of the variance parameters singly and in combination. Variance reports shall always be available to Purchaser. The Bidder shall periodically distribute a variance summary that lists for each variance the report number, a brief overview of the variance, its category, and its priority.

12.4.7 **Variance Records**

The record of each variance shall include the following information:

a. The date of the initial discovery of the variance

b. A variance number – a sequential number assigned when the variance is entered into the tracking system

c. An identification of the person submitting the variance and the names of any other witnesses or knowledgeable Purchaser or Bidder staff

d. An identification of the DC System component, such as a hardware item or software function, against which the variance is being written

e. An identification of the test plan or procedure, if applicable. The stage or step of the plan or procedure shall be identified

f. An overview of the variance suitable for use in keyword searches

g. A detailed description of the variance

h. A variance category:

i. Open (recorded but not scheduled for further action)

ii. Assigned (scheduled for further action)

iii. Pending (the variance has been resolved but not tested)

iv. Closed (Purchaser has accepted the resolution)

i. The date of assignment into each category

j. A variance priority:

Critical To be used only if the DC System is in commercial use, this priority identifies a problem that prevents the use of a system features that is essential to Purchaser's operation of the power system

High Denotes the failure of the DC System to perform a required feature in a manner that significantly reduces the utility of the systems or feature or which delays further testing of the systems or features

Normal Denotes the failure of the DC System to perform a required feature in a manner that reduces the utility of the systems or features. Normal priority variances shall not delay any testing

Low Denotes the failure of the DC System to perform a required feature in a manner that reduces the utility of the systems only slightly. Low priority variances shall not delay any testing. Variances that record transient failures, which cannot be readily reproduced, shall be initially assigned to this priority. Subsequent occurrences of the transient failure shall result in raising the priority of the variance.

A description of the resolution, including identification of all hardware, software, and documents modified or otherwise changed and the names of the Bidder or Purchaser staff involved with the resolution

k. A record of all testing performed

l. Identification of Purchaser staff accepting the resolution and the date of acceptance.

12.4.8 **Schedule for Variance Correction**

The Bidder and Purchaser shall meet periodically to review the variance list. Each new variance opened since the previous meeting shall be scheduled for correction at the meeting. Purchaser and Bidder shall follow these guidelines for scheduling corrections:

a. A schedule for the correction of critical and high priority variances shall be set within one working day of their discovery. The schedule for correction of all other variances shall be set within one working week of their addition.

b. Purchaser and the Bidder shall assign resources for the correction of critical variances with the intent of correcting the variance within two working days of their opening.

c. Purchaser and the Bidder shall establish a mutually agreeable date for the correction of high priority variances, with the overall objective of:

i. If the DC System is in productive use, correcting the variances within one calendar week of their discovery

ii. Prior to the commencement of productive use, maintaining the overall project schedule

d. Purchaser and the Bidder shall establish a mutually agreeable date for the correction of normal priority variances, with the overall objective of:

i. If the DC System is in productive use, correcting the variances within one calendar month of their discovery

ii. Prior to the commencement of productive use, maintaining the overall project schedule

e. Low priority variances may be scheduled for correction at any time and shall not exceed 30 days after identification.

12.4.9 **Variance Resolution**

A variance shall be deemed resolved only upon written acceptance of the correction by Purchaser. Prior to submitting the corrected variance for acceptance by Purchaser, the Bidder shall take all reasonable steps to verify that the correction has resolved the variance and the Bidder shall update the variance record to reflect the corrective action taken. Purchaser shall then schedule any testing to be performed in conjunction with the Bidder.

A variance shall be deemed accepted and the variance record shall be completed only after Purchaser has tested the corrected variance to its satisfaction. The Bidder shall support all testing deemed necessary by Purchaser to verify the corrections.

12.4.10 **Test Schedule**

The sequence of tests to be performed and their scheduling with respect to other activities shall be mutually decided.

12.4.11 **Test Initiation**

The following conditions must be satisfied before starting any test:

a. Purchaser has approved all plans and procedures for the test

b. Purchaser has reviewed or approved all relevant documentation

c. A copy of all relevant documentation including design and maintenance documents, user manuals, test plans, and test procedures has been placed on the test floor

d. A complete regeneration of the software under test has been performed immediately prior to the start of testing

e. All source code libraries have been saved to archive media so that DC System software can be regenerated if necessary

f. For the factory test, preliminary testing, as described in ***Item-12.4.15 Preliminary Factory Testing*** has been completed and the Bidder has submitted written certification that the preliminary testing has been successfully completed.

For the availability test, all critical, high, and normal variances have been corrected and verified to the satisfaction of Purchaser

12.4.12 **Test Completion**

A test shall be deemed to be successfully completed only when:

a. All variances have been resolved to the satisfaction of Purchaser

b. All test records have been transmitted to Purchaser

c. Purchaser acknowledges, in writing, successful completion of the test.

12.4.13 **Test Suspension**

If Purchaser believes, at any time, that the quantity or severity of RTU and Other Systems variances warrants suspension of any or all testing, the test shall be halted, remedial work shall be performed, and the test shall be repeated. The repeat of the test shall be scheduled for a date and time agreed upon by both the Bidder and Purchaser.

12.4.14 **Modifications to the DC System during Testing**

No changes shall be made to the DC System after factory testing has started without the express authorization of Purchaser. It will be Purchaser's intent to carefully control the test

environment so that all changes can be readily identified and so that any changes installed for any purpose can be removed and the previous test environment restored. Purchaser shall have the right to suspend testing, to revert to a previous version of any software or hardware, and to restart any testing previously performed if, in its opinion, changes have been made to the system under test without authorization.

12.4.15 **Preliminary Factory Testing**

The Pre-FAT shall be a complete dry run of the FAT, following the test plans and procedures. The intent is for the Bidder to detect and correct most design, integration, database, display, and performance problems prior to the FAT. The Bidder's project manager shall sign off each test. The completed test results shall be sent to Purchaser for inspection before Purchaser's personnel travel to the Bidder's facilities for the FAT. All tests shall be conducted using Purchaser-specific databases unless Purchaser authorizes the Bidder to use a test database.

The Bidder shall notify Purchaser at least fifteen days prior to the start of the Pre-FAT, and Purchaser shall have the option to witness all or parts of it. The Bidder shall notify Purchaser when the Pre-FAT has been successfully completed and DC System and Other Systems is ready for FAT.

12.4.16 **Factory Acceptance Test (FAT)**

Factory tests shall include:

a. Equipment test

b. Functional test

c. Performance test

d. Stability test

e. Unstructured test

a. **Equipment Test**

The equipment test shall verify that the DC System includes all required equipment, that the equipment is properly configured, and that the equipment can successfully execute the diagnostic programs provided.

The equipment tests shall include a visual inspection for proper workmanship, including cables, connectors, and labeling. The assembly drawings and configuration drawings shall also be

verified at this time. These tests shall also verify that the required DC System capacity performance and functional requirements as specified in this specification have been satisfied.

b. **Functional Test**

The functional test shall use an equipment configuration that may include an extension of the Bidder's deliverables as required to prove the correct functionality of the DC System. The test procedures shall consider all additional test equipment and shall ensure that the additional equipment does not create false test results. The functional tests shall rigorously exercise all functions and devices, both individually and collectively, and shall verify the correct functional operation of all hardware and software. These tests shall include the following, as may be applicable to the system under test:

a. Verification of all hardware maintenance capabilities.

b. Verification of the proper response of the system to at least the following abnormal situations:

i. Loss and restoration of processors, including auxiliary memory of controller

ii. Loss and restoration of input power

iii. Loss and restoration of communication

iv. Detection of and recovery from communication errors

c. Demonstration of the security of the system from unauthorized access

d. Verification of the redundancy and failure recovery schemes of the system

e. Verification that changes of system time will not prevent the system from operating properly and that the system can correctly handle the beginning of a new day, month and year; leap years and the change in century and decade.

f. Documentation verification that will verify that all documentation to be delivered with the system is present and meets requirements.

c. **Performance Test**

The performance test shall verify that the specified performance requirements are met. Simulation shall be provided by the Bidder, where necessary, to create the conditions for the specified performance scenarios. The simulations shall be tested first to verify that the desired activity is being simulated. Execution of the performance tests shall be automated as much as possible so that test runs can be reproduced.

d. **Stability Test**

A 100-hour continuous run of the system shall be performed after successful completion of the functional and performance tests. The stability test will be considered successful if no major hardware failure occurs, no failover occurs, and no restarts occur within the test period.

Major hardware failure is defined for the purpose of this test as the loss of hardware

During this test, the system shall be exercised (with simulated inputs, events, and conditions) in a manner that approximates an operational environment. Purchaser will simulate unstructured user activity during this test. Purchaser will not purposely cause any hardware or software failure, that is, failover and restart testing is not a goal of this test.

The Bidder shall assist Purchaser in this test as required by Purchaser; this assistance will be primarily in the form of helping the set-up of the test, explaining the best procedures to run the test, and explaining all unexpected results.

e. **Unstructured Test**

The unstructured tests will be performed during the functional and performance test period and during the stability test at the discretion of Purchaser.

The Bidder shall assist Purchaser in this test as required by Purchaser; this assistance will be primarily in the form of helping the set-up of the test, explaining the best procedures to run the test, and explaining all unexpected results.

12.4.17 **Site Acceptance Test (SAT)**

The site test includes the installation test, the functional test, and the performance test as specified in the factory test that will be conducted at Purchaser's site after shipment and installation of the Substation DC Systems.

SAT shall cover all equipment and functions as specified for the complete system (all hardware & software) and connectivity with Purchaser's system. As such SAT shall cover all the tests listed in FAT along with site-specific tests including interconnections with systems. Apart from testing and commissioning, SAT shall include one month of continuous trouble-free operation of the complete system without major intervention. In case of interruptions, one month trial shall be restarted after attending to the problem.

i. Vendor shall furnish, advance SAT protocols and list of vendor's instruments for site testing. Tests shall include demonstration of loading & performance of the system.

ii. SAT shall be performed after the system has been installed, functionality checked, system has been running and all commissioning checks have been completed successfully.

iii. Unstructured tests shall be employed as necessary, to verify overall system operation under field conditions.

12.4.18 **Installation Test**

The installation tests shall be conducted by the Bidder and include:

a. A repetition of the equipment test

b. In cooperation with Purchaser, establishment of the communication of DC System Controller with Substation RTU.

12.4.19 **Functional and Performance Tests**

The site functional and performance tests shall be comprised of a subset of the functional and performance tests of **Section 14**, The tests to be performed shall be proposed by the Bidder and approved by Purchaser. These tests shall be extended as necessary to test functions simulated during the FAT. The extended tests shall be performed to a test procedure prepared by the Bidder and approved by Purchaser. Unstructured tests shall also be employed, as necessary, to verify overall operation of the systems under actual field conditions.

12.4.20 **Availability Test**

Substation DC Systems availability in accordance with the criteria specified in the specification, System Availability shall be demonstrated by the availability test.

Predicted availability of equipment supplied shall exceed the following:

System Function	System Availability
DC supply Availability (with or with out AC supply)	100%
Remote Monitoring of Alarm through Controller	99.99%
Remote Monitoring of Analog parameter through Controller	99.99%

12.4.21 **Test Activity**

The test activity shall consist of normal Substation DC Systems in use. Purchaser will modify the input supply during the availability test. Such modifications will be described to the Bidder in advance of implementation to allow assessment of impact on the availability test, except where such changes are necessary to maintain control of the DC power system.

12.4.22 **Test Definitions**

The definitions of the time periods used in determining the duration of the test and the success of the test shall be as follows:

Downtime – Downtime occurs whenever 24V DC supply is not available. Downtime shall be measured from the start of diagnostic procedures until full service is restored. In the event of multiple failures, the total elapsed time for repair of all problems shall be counted as downtime.

Hold time – Certain periods of time during which the Substation DC Systems is down may be due to circumstances that are beyond the control of either party. These contingencies may prevent successful operation of the systems but are not valid for the purpose of measuring systems availability. Such periods of unsuccessful operation may be declared hold time by mutual agreement of Purchaser and the Bidder. Specific instances of hold time are:

Power Interruption & environmental excursion – Loss of power or manual shutdown of the Substation DC Systems in the event of power excursion or the loss of environmental control shall be considered hold time. If the systems are operated during periods of power or environmental conditions beyond those specified, any resultant downtime shall be considered hold time.

Intermittent failure – Periods during which an intermittent, recurring failure is experienced will be considered hold time, provided that the Bidder is engaged in remedial action and normal operation of the Substation DC Systems.

Failure of RTU – Time during which the Purchaser's RTU failed to communicate with DC system controller shall be considered hold time.

Corrected design defect – Hold time may be declared by mutual agreement to ensure against similar future occurrences if a failure occurs due to a defect in design for which the Bidder defines and implements corrective measures. In such a case, enough hold time shall be allocated to allow verification of the corrective action.

Logistics delays – If repairs are delayed due to previous use of spare parts or because of Purchaser's failure to purchase recommended spare parts, hold time will be declared after diagnosis of the failure and while the Bidder is pursuing replacement parts in an expeditious fashion.

Service response time – Hold time shall be declared from the time that a failure is detected until diagnostic procedures are begun. A maximum 4 hours of hold time will be allowed for each failure, till battery gets fully drained out.

Total time – The time elapsed from the start of the availability test until the end of the availability test

Test time – The time elapsed from the start of the availability test until the end of the availability test, excluding hold time. That is,

Test_time = Total Time – Hold_time

12.4.23 **Duration and Criteria for Passing**

In order to establish that all failures have been satisfactorily repaired prior to the end of the availability test, no downtime, intermittent (hold time) failures, or more than one uncommanded failover shall have occurred within 200 hours of the test's conclusion. The test shall be extended, if necessary, to satisfy this requirement.

After successful completion of site acceptance test and 72 hours have passed, system availability shall be computed using the following formula:

System_Availability = [(Test_time – Down Time) / Test_time] X 100%

If the system availability requirements presented in the specification, System Availability, have not been met, the test shall continue until the specified availability is achieved. Alternatively, and at Purchaser's discretion, the test may be restarted.

When it has been determined that the system availability requirement has been met, the availability of each System device shall be calculated and compared against the device availability requirements as specified, Availability Requirements – DC System. If one or more devices do not meet the requirements, the test shall be extended until Purchaser and the Bidder mutually agree that corrective action has been completed for those devices. Corrective action shall include all necessary procedures to test and verify proper operation to Purchaser's satisfaction.

13.0 Warranty, Maintenance and Upgrades Requirements

This Section specifies the requirements for Warranty of hardware and software maintenance of the System, system upgrades etc.

Bidder to note the environmental condition of locations, the proposed system is being planned to be installed and operational.

a. Bidder shall provide facilities for carrying out onsite and off-site maintenance of the components supplied as a part of the system. In general, this should include adequate testing equipment, tools, safety devices and other accessories. Bidder shall provide the details in their bid.

b. Bidder should provide Maintenance strategy of the product (Own & Sub-Vendor) being offered so as to schedule appropriate timeline for maintenance.

13.1 Maintenance Performance Requirement

Purchaser envisaged that all offered equipment shall require routine or planned maintenance.

13.2 Service Life

Purchaser prefers that the equipment shall be capable of complying with this standard, including performing its intended purpose, for a minimum of 10 years from the date of commissioning.

The supplier shall indicate the following:

a. The date at which the product was released for sale.

b. The anticipated date at which the product will be withdrawn from sale, but support will continue to be provided for Spares and Services.

c. The anticipated date that product support will be withdrawn, i.e. spares and technical support will no longer be available.

13.3 **Interchangeability**

All the parts/modules shall be interchangeable individually (e.g. Battery, Controller, Rectifier unit parts) and as a whole. This is applicable for all the parts/module supplied by the bidder under this contract.

Any such change or replacement shall not reduce the capability of the equipment to conform to the requirements of this specification.

13.4 **Definitions**

The responsibility for maintenance of hardware and software will vary depending on the time during the Contract. So that the times for changes in responsibility can be determined, the following definitions shall be used:

Delivery – Delivery of any item shall be interpreted as receipt of the item at Purchaser's facility.

Commissioning – Commissioning of any item shall be interpreted as receipt of the item at Purchaser's facility, installation on-site, successful completion of the site tests, and correction of all variances from the tests.

13.5 **Deliverable Hardware and Software Version**

The delivered Hardware and Software shall be the latest version being delivered by the manufacturer of the Hardware & Software six months prior to its delivery to Purchaser's facility. During delivery of the system.

All hardware and software shall be of compatible versions. That is, the Bidder shall be responsible to ensure that all delivered hardware and software versions will inter-operate successfully. If it becomes necessary to upgrade some hardware or software to meet this requirement, the cost and time shall be borne by the Bidder. If it is necessary to revert to a previous version of any hardware or software to overcome incompatibilities among the hardware or software, the Bidder shall bear the cost and time of the "downgrade" and shall present a plan to correct the problems with the newer release. Such corrections shall also be at the Bidder's sole expense.

13.6 **Warranty support**

a. **Maintenance services** for the supplied Hardware, System and application Software up-gradation services including sub-vendor products during the Standard warranty period of 5 Years from the date of system handover after SAT, resolution of all punch point of SAT and trouble-free operation of the entire system for a period of one month.

b. SLA will be prepared and adhered by Bidder, Sub-Vendor's of bidder for extending the Hardware, Software and Service support to Purchaser for the period mentioned above. To mitigate major failure like Complete system failure, DC System instability, loss or failure of any major subsystem or system component such as to cause a significant adverse impact to system availability, performance, or operational capability. Some of the salient points as example are documented below:

a. Bidder shall report to site within 24 hours of receipt of reporting of the failure occurrence

b. Bidder shall provide replacement of the faulty equipment within 7 days after confirmation of the fact that the equipment can't be repaired at site. Failure to this clause may have some penalty reference on Bidder.

c. Bidder will mandatorily provide detailed analysis report of the faulty equipment within 15 days from the date of the site visit.

d. Any spare Equipment replacement, testing and its commissioning to be done by bidder, with no cost implications to Purchaser. Any tools, equipment, Software or Hardware required for testing of the System will be the responsibility of the Bidder, this includes all system supplied by bidder under this contract.

e. Any up gradation in hardware and software will be informed to Purchaser and necessary up gradation to be carried out by Bidder with no cost implications to Purchaser.

Bidder to note that Tri-Party agreement will be prepared for Bidder, Sub-Vendor to have protection against quitting of executing bidder and its alliances during commissioning, warranty period as specified in this document. This will take place with the successful bidder.

13.7 **Hardware Maintenance**

The project schedule shall include an allowance for hardware maintenance prior to the availability test. The Bidder will not be granted any relief for project delays caused by maintenance problems prior to the availability test.

13.7.1 **Pre-Delivery Maintenance**

The Bidder shall have the responsibility for maintenance of all hardware prior to delivery to Purchaser's site. This maintenance may be performed by a maintenance contract with Original Equipment Manufacturers (OEMs) or other parties or by the Bidder staff using spare parts from the Bidder's stores or other sources.

13.7.2 **Maintenance During Commissioning**

The Bidder shall have the responsibility for maintenance of all hardware after delivery and prior to commencement of the Warranty. This maintenance may be performed by a maintenance contract with OEMs or other parties or by Bidder staff using spare parts from the Bidder's stores or other sources.

Failed equipment shall be replaced and spares inventories (if any) replenished to their delivered level throughout the period of commissioning. Any spare parts found to be defective during initial delivery inspection or during this period shall be replaced within one week after notification. There shall be no charges to Purchaser for these replacement parts, including to and fro delivery charges. All spare parts replaced under maintenance shall be new parts unless otherwise accepted by Purchaser.

13.7.3 **Maintenance Under Warranty**

Maintenance during the warranty shall be in conformance with the terms of the warranty sections of this RFP ***(Item 12.11)*****.**

During the warranty period, Purchaser's hardware maintenance responsibilities will include the following:

a. Provision of trained staff, responsible for call-out when problems occur

b. Providing local assistance to the Purchaser during problem resolutions

The Bidder's hardware maintenance responsibilities shall include the following:

a. Providing maintenance of all equipment, including spare parts

b. Providing materials and instruction for appropriate engineering changes for equipment

c. Provision of technical guidance towards the resolution of all hardware problems for equipment.

When needed, the Bidder shall respond to requests for technical support within Two Hours, 24 hours a day, seven days a week.

Failed equipment shall be replaced or repaired, and spares inventories replenished to their delivered level throughout this period. Any spare parts found to be defective during initial delivery inspection or during the Warranty period shall be replaced within one week after notification, *at free of cost to TPCODL*. There shall be no charges to Purchaser for these replacement parts, including to and fro delivery charges. All spare parts replaced under maintenance shall be new parts unless otherwise accepted by Purchaser.

The Bidder's technical support staff shall work with Purchaser's technical staff to establish a strategy to efficiently resolve each identified problem. If at any time, Purchaser believes that the Bidder's technical support is not effectively resolving a problem, Purchaser may request that the Bidder's system expert or staff from the equipment's manufacturer be dispatched to Purchaser's facility. The Bidder's technical team shall be at Purchaser's facility within 48 hours of that request to provide hands-on support towards the problem resolution. Purchaser will not be responsible for any expenses connected to the technical support, including travel expenses.

The Resolution time for different complaints shall be as per the below matrix:

Category	Definition	Maximum Resolution Time
Severity 1 Urgent	Complete system failure, severe system instability, loss or failure of any major subsystem or system component such as to cause a significant adverse impact to system availability, performance, or operational capability	0-4 hrs.
Severity 2 Serious	Degradation of services or critical functions such as to negatively impact system operation. Failure of any redundant system component such that the normal redundancy is lost .	0-24 hrs.
Severity 3 Minor	Any other system defect, failure, or unexpected operation. Request for information, technical assistance, “how to” guidance requests.	0-48 hrs.

Failure by the Bidder to comply with the above-mentioned timelines, shall attract Penalty. Penalty amounts shall be recovered from the amounts due to Bidder or by invoking the Contract Performance Bank Guarantee submitted by Bidder against this Contract will be capped to maximum of 10% of the Contract value. Overall penalty including LD cumulatively will be 10% of the contract value.

13.7.4 **Hardware Minimum Support Period**

The Bidder shall guarantee the availability of spare parts and hardware maintenance support services for all System equipment for a minimum period of 10 years. Subsequent to this minimum support period, the Bidder shall provide to Purchaser a minimum of two year's advance notice of their intent to terminate such services.

13.8 **Upgrades & Modifications**

a. Bidder shall continuously keep the Purchaser informed of all Software and Hardware upgrades as & when these are released.

b. Bidder shall supply upgrades and patches of all installed software (both own and third party) for a period of five years from the date of system acceptance without commercial implication.

c. Bidder shall provide lifetime support (10 years) for the system. To meet this requirement, Bidder shall provide details of the product's life cycle management and obsolescence. Bidder shall attach the product life cycle matrix for hardware offered under this RFP.

d. The system referred to above includes Bidder's own as well as third party components.

14.0 Training

Bidder shall provide training to the Purchaser's personnel on the operation and maintenance of the system supplied equipment including non-OEM equipment/3rd Party equipment. The training shall cover technical details of equipments supplied, design aspects, maintenance practices of the system.

The Bidder shall provide Classroom as well as hands-on training on the offered System. All required training materials such as System Catalogs, Test Instruments, Demo Equipment, and Simulation Jigs, etc. shall be arranged by the Bidder for own and Sub-Vendor Equipment. The training shall equip the Purchaser's engineers for Installation, Commissioning, Operation and Maintenance of Hardware, Software etc.

Hardware training shall qualify Purchaser to perform routine preventive maintenance, diagnostic testing on DC System equipment.

Bidder shall indicate their Training facilities including test tools and simulation facilities. Bidder shall provide the training calendar and details of topics considered for the equipment offered.

The schedule, location and detailed content of each course will be finalized during detailed engineering.

Bidder to consider 10 man-days of Trainer to provide on-site training to Purchaser's personnel. Bidder to note that the indicated man-days will be utilized in batches (Not more than 5) covering all Distribution Circles of TPCODL.

14.1 **Training Requirement**

Bidder shall provide training to the purchaser's personnel on the operation and maintenance of the system supplied by him.

General requirements relating to the training are specified below:

a) Personnel who speak understandable English and who are experienced in instruction shall conduct training courses.

b) Classroom and Hands-on training shall be on the identical system being supplied to Purchaser.

c) Bidder shall provide all necessary training material. Each trainee shall receive individual copies of the technical manuals and pertinent documents. These materials shall be supplied at least one month before the scheduled commencement of the training course.

d) The purchaser shall be permitted to video tape all training classes.

e) Class materials, including documents sent before the training classes and class handouts, shall become the purchaser's property. The purchaser may copy this material for in-house training and organization use only.

14.2 **Substation DC System Training**

Substation DC System course shall be designed to provide Purchaser's personnel enough knowledge of the overall design and operation of the system so that they can correct obvious problems, perform preventive maintenance, run diagnostic programs, and communicate with OEM personnel. The following subjects shall be covered:

15.0 Tools Tackles for Erection & Commissioning

Bidder to consider and supply special tools and tackles (Hardware and Software) required for erection, commissioning, and maintenance of the offered system. After commissioning of the system all tools and tackles shall be handed over to Purchaser's Project/Maintenance team.

All tools (both hardware and software), test instruments, simulation jigs, documents, programming equipment etc. required for Installation, Testing & Commissioning are in the scope of the bidder.

All configuration cables and other specialized testing passive devices to be provided with the supply of material.

16.0 Spares

a. Bidder needs to include competitive price for Mandatory Spare parts against the below specified list.

b. Bidder shall include list of spares with quantities as recommended by him required for 10 years trouble free operation of equipment.

c. The spares supplied shall be strictly interchangeable with parts for which they are intended for replacement.

d. The spares shall be treated and packed for long storage (minimum 10 years) under the climatic conditions prevailing at the site.

e. The start-up spares shall be delivered at the site well in time before the start-up and commissioning of the System.

16.1 Start-Up Spares:

The start-up spares are those spares which will be required during start-up and commissioning of the equipment/systems, and until Final Take Over. It is the responsibility of the bidder to supply all the necessary spares as required until the equipment/systems are handed over to the Purchaser. An adequate stock of start-up spares shall be available at site such that the start-up and commissioning of the equipment/systems, performance testing and handing over the equipment/systems to the Purchaser be carried out without hindrance and delay. The Bidder shall furnish the Schedule of Start-up Spares.

16.2 Mandatory Spares

Essential spares are those considered necessary by the owner for ten (10) years of normal operations Sub-Station DC System. A list of such spares has been listed in the below mentioned table and the same shall be included in bidder’s scope. Whenever the item of spares has been indicated as `set' the same shall mean the supply for a single equipment/system. One set of spares for the particular equipment shall mean the total quantities of that particular spares for

a single equipment. The `set' shall however include all components required to replace that item of spares. The Owner reserves the right to buy any of the essential spare parts as considered necessary.

In case during start-up and commissioning certain essential spares are used up, the same shall be replaced within one (1) month without any commercial implications.

Bidder shall furnish details for all essential spares as per the approved vendor document list.

Bidder to consider following mandatory spares in the offer.

1	2	3	4
Sl. No.	**Item Description (Bidder to consider following Spares as per the Solution proposed)**	**UOM**	**Total Required Quantity**
1	Battery Charger - Rectifier Unit	Sets	10
2	DC MCB	Nos.	20
3	DC System Controller	Sets	5
4	Battery (24V)	Nos.	10
5	Surge Protection Device (SPD)	Nos.	20
6	Indicating LED Lamps as per the design	Nos.	10

Note: Bidder to note that all above equipment shall be supplied along with necessary cable and accessories.

The table above indicate the minimum requirement of the Purchaser, bidder to include 5% spares, which are not part of this table, but required for maintenance and upkeep of the system.

16.3 **Recommended Spares**

In addition to the spares mentioned above, the Bidder shall also furnish in his bid a list of recommended spares which may be required for ensuring the availability during the guaranteed availability period with unit prices. The final list of spares shall form part of scope of supply and accordingly the price thereof shall be quoted by the bidder and shall be considered in the evaluation of the bids. The Purchaser reserves the right to buy any of the recommended spare parts as considered necessary by him. The prices of recommended spares shall be

consistent with those of start-up/essential spares. Purchase of these spare parts will be covered under this order / by a separate order / an amendment to the contract.

The Bidder shall provide a list of recommended spares for a period of Ten (10) years from the date of handover of the project to Purchaser. The shelf-life of these spares is such as to last for at least Ten (10) years from the date of handover of the project. Spare parts supplied by the bidder shall be made available to the bidder for usage subject to replenishment at the earliest (within a month). Thus, at the end of every quarter the inventory of spares with the Purchaser shall be fully replenished by the bidder. However, any additional spares required to meet the availability of the system (which are not a part of the spares supplied by the bidder) should be supplied immediately by the bidder free of cost to the Purchaser The list shall include the following:

Sl. No	Item Part Description	Recommended Quantity	Procurement Lead Time	Quantity of item held in Local office of Bidder	Quantity of item held in Head Office of Bidder as an emergency spare	Unit Price	Total Price

The Bidder shall provide the MTBF of various components, sub-assemblies, assemblies etc. (recommended as spares) and the relationship between MTBF and spare quantities recommended. The bidder is required to list the spares.

The Bidder shall submit the product life cycle details of the all hardware offered under this RFP.

End of Section-A

Document Title: DC System for 33/11 kV Primary Substations

Document No: A&T/2021/SPEC-03/PSS-DC SYSTEM

Section – B

Detailed Technical Specifications

TP CENTRAL ODISHA DISTRIBUTION LIMITED
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Revision	Date	Description	Approvals		
			Prepared By	Checked By	Approved By
R0	24th Dec 2021	Released for Procurement	TKB/GSB	AKA	RKR

Section – B

Detailed Technical Specifications

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Chapter # 1

DC System:24 V VRLA Type Storage Battery

2.0 Technical Specification For 24 V VRLA Type Storage Battery

2.1 Scope

This part of the specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading of 24V VRLA 150 AH (Type-1) and 200 AH (Type-2) Battery along with battery charger and other accessories for efficient and trouble-free operation. Dismantling and replacement of the purchaser's existing battery and battery charger with proposed and suitable DC system. The materials offered shall have been successfully Type Tested during last five years on the date of bid opening. The Type Test reports shall be submitted along with the bid.

It is not the intent to specify completely herein all the details of technical design and construction of material. However, the material shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in manner acceptable to TPCODL, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.

2.2 Standards

The equipment shall comply in all respects with the latest edition of relevant Indian Standard Specifications and IEC except for the modifications specified herein. A Photocopy of such standards in English shall be enclosed with the offer.

Sl. No.	Code	Brief Description of the Standard
1	IS 266-1993	Battery grade Sulphuric Acid
2	IS 1146-1981	Rubber and plastic container for lead acid storage batteries
3	IS 1069-1993	Water for storage batteries
4	IS 694-1990	PVC insulated cables
5	IS 1651-1991	Stationery cells & batteries lead acid type (with tubular positive plates)
6	IS 9224-1991	Stationery cells & batteries lead acid type (with plante positive plates)
7	IS 3116-2002	Low voltage fuses
8	IS 4540-1968	Sealing compound for lead acid batteries
9	IS 3895-1966	Semiconductor rectifier assemblies and equipment, mono-crystalline
10	IS 6071-1986	Semiconductor rectifier cells and stacks mono-crystalline
11	IS 8320-2000	General requirements and methods of tests for lead acid storage batteries

2.3 Installations

Equipment covered under these specifications shall be suitable at 33/KV substation control room environment.

2.4 Details of Specifications of VRLA Type (24V)

2.4.1 **Battery**

The batteries shall be made of closed type lead acid cells with VRLA Type (24V) plates manufactured to conform to IS: 1652-1991.

2.4.2 **Capacity**

The capacity of the batteries shall be of two types (i.e. 150 AH and 200 AH) as follows:

a. Voltage - 24V

b. Output at 27°C – 150 AH (Type-1) and 200 AH (Type-2) at 10 hrs. discharge rate.

The batteries shall normally remain under 'floating' condition with the 'trickle' charger supplying the continuous load. However, the batteries shall be capable of supplying the following loads under emergency conditions without any assistance from the chargers and without their terminal voltage falling below 21.6V [90% of rated voltage].

The number of cells for 24V batteries shall be so chosen that for the nominal floating voltage of the cells, the battery voltage shall be 26V and for the minimum [discharged condition] voltage of the cells, the voltage of the battery shall not be less than 21.6, while the assigned rating of the battery bank cannot be lowered below its rated voltage of 24V volts. Minimum no of cell shall not be less than 12.

2.5 Design and Constructional Details

The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1 g. General Technical requirement are tabulated below:

Sl. No.	Particular	TPCODL Requirement
1	Type of battery	Lead acid battery
2	Container	Transparent
3	Nominal DC system voltage	24 V
4	Number of Batteries	One Set
5	Number of Cells	12
6	Cell Type	Plante/Low maintenance Tubular

		Gel Type
7	Cell Voltage	
a)	Nominal	2 V
b)	End Cell Voltage	1.85 V
8	Capacity of Battery (10 Hour rate of discharge)	150 AH(Type-1) & 200 AH (Type-2)
9	Float Charging Voltage	2.15 V to 2.25 V
10	Boost Charging Voltage	2.00 V to 2.75 V per Cell
11	Mounting Arrangement	Double Row, Single Tier

2.5.1 **Plates**

Positive plates shall be made of flat pasted type using lead-cadmium antimony alloy for durability, high corrosion resistant, maintenance free, long life both in cyclic as well as in float applications. Negative plates shall be heavy duty, durable flat plate using lead calcium alloy pasted box grid. Negative plates shall be designed to match the life of positive plates and combination of negative and positive plates shall ensure long life, durability and trouble-free operation of battery.

2.5.2 **Container and Lid**

The containers and lids shall be made of a special grade polypropylene copolymer plastic material. They shall be sufficiently robust and not liable to deformation under internal operating pressures and within the temperature range naturally encountered, leak proof, non-absorbent and resistant to the acid with low water vapor permeability. The surface of the container shall be free from blisters, rough spots, scales, blow holes and other imperfections or deformations. The cell plates shall be suspended without touching the bottom of the container. It shall provide enough sediment space so that the plates can shed their active material without shorting the plates in the cell during the expected life of the battery without cell cleaning. The plastic container shall conform to all the requirements as mentioned in IS 1146. The covers shall be furnished with acid spray proof vent plugs. The cell post polarity shall be marked on the cover. The electrolyte level lines for upper and lower limits shall be marked on all four sides of each container.

2.5.3 **Separators**

The separators shall be of synthetic material conforming to the latest edition of IS-6071-1986. These shall permit free flow of electrolyte and would not be affected by the chemical reaction inside the cell and shall last for indefinite time. The internal resistance factor of the separators

shall assure high discharge characteristics under all operating conditions. Proper arrangement to keep end plates in position shall be furnished by the bidder along with his offer.

2.5.4 **Electrolyte**

The electrolyte shall be prepared from the battery grade Sulphuric acid conforming to IS-266-1993 and shall have a specific gravity of 1.2 at 27°C. The battery shall be shipped uncharged with the electrolyte. Electrolyte for the first filling shall be supplied with 10% extra in non-returnable containers. The Sulphuric acid of battery grade shall be colorless liquid. The concentrated Sulphuric acid on dilution with an equal volume of distilled water shall be free from suspended matter and other visible impurities. The Sulphuric acid shall meet the requirements of columns – 4 and 5 Table –1 of IS-266-1993.

2.5.5 **Plate Group Bar with Terminals**

The plate group bar with terminals shall conform to IS-1652-1991. The positive and negative terminals shall be clearly marked for easy identification. The legs of the plates of like polarity shall be connected to the load, turned to a horizontal group bar having an upstanding terminal post adopted for connection to the external circuit. The group bars shall be sufficiently strong to hold the plates in position.

2.5.6 **Buffers/Spring**

Suitable buffers / springs shall be provided in the cells to keep the end plates in position. These shall have adequate length and strength.

2.5.7 **Cell Lids**

Lids used with sealed or closed type cells shall be of glass, plastic or ebonite and shall be provided with vent plugs. Terminal post shall be suitably sealed at the lid to prevent escape of acid spray, by means of rubber grommets, sealing compound or other suitable device. The positive and negative terminal posts shall be clearly and indelibly marked for easy identification. Sealing compound shall conform to IS 3116.

2.5.8 **Water**

Water used for preparation of electrolyte and also to bring the level of electrolyte to approximately correct height during operation / testing shall conform to relevant standards.

2.5.9 **Venting device**

The venting device shall be anti-splash type and shall allow gases to escape freely but shall effectively prevent acid particles or spray from coming out. There shall be two vent holes, one serving as a guide for acid level indicator for checking the electrolyte level and other to permit drawing of electrolyte samples, servicing, checking of specific gravity etc.

2.5.10 **Fasteners**

Bolts, nuts and washers for connecting the cells shall be effectively lead-coated to prevent corrosion. Where it is not possible to bolt the cell terminals directly to assemble a battery, separate lead-coated copper or aluminum connectors of suitable size shall be provided to join the cells.

2.5.11 **Stand & Battery Racks**

The cells shall be supported on insulated rack fixed with pads and with adequate clearances between the adjacent cells. The battery racks shall be made of best quality material having the features of rodent proof, rust proof, sustainable to saline/coastal environments with at least three (3) coating of anti-acid paint of approved shade. Racks shall be rigid, numbering tags for each cell shall be attached on the racks. Bidder is responsible for replacement of the battery rack if any damage/deterioration found during the warranty period.

2.5.12 **Marking**

Acid level line shall be permanently and indelibly marked around on all the containers.

The unit shall be provided with a name plate clearly visible and effectively secured against removal. The name plate shall be indelibly and distinctly marked with all essential particulars as per relevant standards along with the following:

a. Manufacturer's name

b. Month and Year of manufacture

c. Serial number and Type designation

d. Lead acid chemistry type of the battery

e. Nominal voltage of each cell

f. Ah capacity at 1C rate of the battery

g. Rated voltage

h. No. of cells in each module

i. No. of modules

j. Installed battery capacity (kWh)

k. Input charge voltage

l. Charge current

m. Discharge current

n. Guarantee period

o. Reference standard

p. Property of: TPCODL

Also, the danger plate should be shown in front of the enclosure / Cabinet / Racks housing the battery banks.

2.5.13 **Connectors**

Bars tinned copper lead connectors shall be employed for inter-cell and inter row, inter-t connections. However, the tee-off connection from the battery unit shall be made with acid resisting cables of suitable size. A suitable terminal box along with acid-resisting cable shall be provided by the Contractor for this purpose. The connectors shall preferably be of bolted type and the bolts and nuts shall be of similar material as that of connectors and shall be provided with corrosion resisting lead coating. The connectors shall be of enough cross-section to withstand all the working conditions including one-minute discharge rate as well as short circuit conditions. Terminals post shall be designed to accommodate external bolted connection conveniently. The junction between terminal posts and cover and between cover and container shall be so sealed as to prevent any seepage of electrolyte.

Positive and negative terminals posts of cells shall be clearly and unmistakably identifiable. The positive terminals shall be marked with red color in addition to '+' marking and negative terminal shall be marked suitably. The terminals and connectors shall not be covered with grease instead anti oxidation jelly shall be used.

a. Lead coated connection hardware such as bolts, nuts etc. 5% extra, or any other connector suitable for VRLA type Battery.

b. Ampere-hour Meter [10-hour discharge rate] of 100 –150 AH range-1 no.(Type-1) and 150-200 AH range-1 no. (Type-2)

c. Any other accessories not specified but required for installation, satisfactory operation and maintenance of batteries for a period of 5 [five] years.

2.5.14 **Maximum Short Circuit Current**

The Bidder shall state the maximum short circuit current of each battery along with the safe duration in seconds which it can withstand. Methods proposed to be adopted for protecting batteries from the short circuit conditions should also be stated to avoid damage to the battery and loss to the associated equipment.

2.5.15 **Charging**

The bidders shall state whether an equalizing charge is recommended for the battery. If so, the equalizing charge voltage, current, duration and the interval between the equalizing charging shall be specified in the Data sheet. Bidder shall also indicate the requirements for boost charging.

2.5.16 **Life**

The minimum guaranteed life span of the battery should not less than 5 years. The bidder shall quote in his offer the guaranteed life of the battery when operating under the conditions specified.

2.6 Instruction Manuals

Fifteen sets of instruction manuals for installation, commissioning, charging and maintenance instruction shall have to be furnished.

2.7 Tests

2.7.1 Type Tests

The bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA or any NABL accredited laboratory. Type tests should have been conducted in certified Test laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy

in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to TPCODL.

a. Verification of constructional requirements

b. Verification of marking

c. Verification of dimensions

d. Test on capacity

e. Test for Loss of Capacity on Storage

f. Test for retention of charge

g. High rate discharge at Normal Temperature

h. Endurance Test

i. Ampere-hour and watt-hour efficiency test

j. Test for voltage during discharge

If the Type Test report [s] does/do not meet the requirements as per this specification, at its discretion may ask the Contractor to conduct the above type tests [s] at the Contractor's cost in the presence of purchaser's representative without any financial liability to purchaser.

2.7.2 **Acceptance Tests**

Following shall constitute the acceptance tests which shall be test witnessed by the purchaser's representative at the works of the manufacturer at the cost of supplier.

a. Verification of marking

b. Verification of dimensions

c. Test for capacity for 10 hours discharge rate along with the Test for voltage during discharge.

d. Ampere-hour and watt-hour efficiency test.

2.7.3 The Purchaser may at his discretion undertake test for capacity and voltage during discharge after installation of the battery at site without any extra cost.

2.7.4 The Contractor shall arrange for all necessary equipment including the variable resistor, tools, tackles and instruments. If a battery fails to meet the guaranteed requirement, TPCODL shall

have the option of asking the Contractor to replace the same within 15 [fifteen] days from the date of declaring the same to be insufficient/failed / not as per the specification [s].

2.8 Drawings / Documents

The tenderer shall submit the following drawings / documents along with his offer failing which the offer is liable for rejection.

a. General battery arrangement, proposed size of individual and over all dimensions along with sectional views showing all connections etc.

b. Pamphlets and technical literature giving detailed information of the batteries offered.

c. The Contractor shall submit the following drawings / documents in two copies for approval

i. Lay out details of the batteries.

ii. OGA and cross-sectional details for battery cells.

iii. Instruction manuals for initial charging and subsequent charging.

iv. Technical data, curves etc.

2.9 Guaranteed Technical Particulars

The Guaranteed Technical Particulars shall be furnished along with the drawing for approval.

2.10 Deviation from Specification:

All deviations from the specification shall be separately listed, in the absence of which it will be presumed that the provisions of these specifications are complied with by the bidder.

2.11 Recommended and Mandatory spares

Recommended and Mandatory spares shall be supplied by the bidder, without any cost implication to TPCODL.

Chapter # 2

70A Battery Charger for 24 V-150 AH (Type-1) & 24 V-200 AH (Type-2) VRLA Type Battery with Microprocessor based Communicable Controller

This part of the specification covers the technical requirements of design, Engineering, manufacture, stage testing, inspection and testing before dispatch, packing, forwarding, delivery at site and unloading of SMPS based battery charger with DCDB suitable for Indoor/Outdoor installation, complete with all fittings accessories and associated mandatory auxiliary equipment which are required for efficient and trouble-free operation.

The system is required for reliable and uninterrupted D.C. supply for closing and tripping coils of circuit breakers, relays, RTU, Communication equipment, IEDs etc. in 33/11 kV distribution Substations of TPCODL.

It is not the intent to specify completely herein all the details of tech design and construction of material. However, the material shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in manner acceptable to TPCODL, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered material shall be complete with all components necessary for their effective and trouble-free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.

3.0 Technical Specification of 70A Battery Charger for 24 V-150 Ah (Type-1) & 24 V - 200 Ah (Type-2) VRLA Type Battery

(70 Amp single phase Charger (Float Cum Boost Charger) suitable for 24V, 150 AH (Type-1) & 24V, 200 AH (Type-2) Maintenance Battery Type VRLA)

3.1 Brief Description

Charging equipment comprising of a Float cum Boost (70 Amp, Float Cum Boost Charger) suitable for 24V, 150 AH (Type-1) & 24V, 200 AH (Type-2), Maintenance free VRLA Battery charger, is required to meet the D.C. power requirement of the sub-station under normal conditions, i.e., when AC auxiliary power supply is available and also to keep all the cells in the state of full charge. The float charger shall supply the continuous DC load at the bus bars in addition to keeping, batteries floated in a healthy condition. In case of failure of A.C. mains or sudden requirement of additional DC power, the battery shall meet the demand as the battery shall be connected in parallel with the charger. After the battery has discharged to a

considerable extent, it shall be fully recharged by the 'boost' charger unit in a short period so as to prepare it for the next emergency. Even during the 'boost' charging of the battery, the continuous DC load at the bus shall be met by the trickle-charging unit. The 'boost' charging unit shall however be provided with suitable control arrangement to function as a standby for float charging unit in case of necessity.

3.2 **Applicable Standards**

The equipment shall comply in all respects with the latest edition of relevant Indian Standard Specifications and IEC except for the modifications specified herein. A Photocopy of such standards in English shall be enclosed with the offer.

Sl. No.	Code	Brief Description of the Standard
1	IS:3895/1966	Specification for the rectifier equipment
2	IS: 1248	Specification for Indicating instrument
3	IS:375 /1963	Specification for wiring
4	IS: 4540/1968	Specification for Mono crystalline semiconductor rectifier Assemblies
5	IS:13947/ 1993	Specification for Air Break Switch/Contactor
6	IS: 8828/1993	Specification for Miniature circuit breaker
7	IS:6619	Safety code for semiconductor rectifier Equipment
8	IS:2147	Degree of protection for cubicle
9	IS 6619: 1972	Safety Code for Semi-conductor Rectifier Equipment
10	UL 1564	UL Standard for Safety Industrial Battery Chargers
11	IEC 61000-4-17	Electromagnetic compatibility (EMC) – Part 4-17: Testing and measurement techniques – Ripple on DC input power port immunity test

3.3 The system shall employ a modular configuration to provide flexibility in view the future load requirements of DC power. All factory wiring for the rack shall be for the ultimate capacity so that only plugging of FR/FC module shall enhance the DC power plant output. The modules shall be accommodated in a rack. Following are the major components, which should be considered in float cum boost charger:

Sl. No.	Component Name	Float Charger	Float Cum Boost Charger
1	Triple pole ON/OFF AC Moulded Case Circuit Breaker (MCCB 50 KA) for the AC incoming of the FC or FCB Charger with alarm contact for annunciation.	1 No.	1 No.
2	LED type pilot lamps with series resistors to indicate AC mains `ON' condition	3 Nos.	3 Nos.
3	Double wound impregnated naturally air cooled three phase mains transformer necessary secondary tapes	1 No.	1 No.

	for achieving required control DC output voltage.		
4	Three phase, full wave, fully controlled rectifier bridge comprising of MOSFETs / IGBTs liberally rated, mounted on heat sinks and complete with resistor / condenser network for surge suppression, with rectifier MCBs & its trip alarm indication	1 No.	1 No.
5	Filter circuit comprising of smoothing choke and condenser with MCBs for condenser & its trip alarm indication.	1 No.	1 No.
6	Electronic controller to stabilize the DC output voltage of the float charger as per battery cell voltage for input voltage variation of +/-10% from 415V, frequency variation of +/-5% from 50 Hz and simultaneous DC load variation of 0-100% and also complete with load limiting circuit to droop the float charger output voltage upon overloads to enable the Battery to take over	1 No.	1 No.
7	Dropper diode selector switch with minimum three positions along bypass scheme in case voltage reaches to one specified level.	As per battery design	As per battery design
8	Auto/Manual selector switch for selecting the mode of operation of float charger	1 No.	1 No.
9	Potentiometers for setting DC output voltage in the Auto Mode and for adjusting the voltage in the Manual Mode	1 set of two Nos.	1 set of two Nos.
10	The float charger DC output current measurement.	1 No.	1 No.
11	The float charger DC output voltage measurement.	1 No.	1 No.
12	Double pole ON/OFF DC Moulded Case Circuit Breaker (MCCB 10KA) for the float charger Output With alarm contact for annunciation	1 No.	1 No.
13	Float Charger Blocker diode with suitable heat sink	1 Set	1 Set
14	DC `ON' indicating LED type pilot lamp	1 No.	1 No.
15	Float charger DC under voltage Sensing	1 No.	1 No.
16	Float charger DC over voltage Sensing	1 No.	1 No.
17	Auxiliary AC contactor to be interlocked with the DC contactor on the positive bus		1 No.
18	Constant current/ Constant voltage selector switch to select the Boost/ Float mode of operation for the Float cum Boost charger		1 No.
19	DC contactor with power ` NC' contact interlocked with the AC Auxiliary Contactor of the float cum boost charger so that whenever the float cum Boost charger	1 No.	1 No.

	operated in its constant current Mode, the contact of DC Contactor on the positive bus bar opens out thus preventing the reflection of the excessive boost charging voltage across the DC load terminals.		
20	Silicon blocking diode connected in series to the 84th cell of the Battery Bank to maintain continuity in the DC supply even during the second power failure during boost charging of the battery (required in case of Ni-cd Battery)	2 Nos.	2 Nos.
21	The charge/ discharge current of Battery	1 No.	1 No.
22	Double pole ON/OFF DC MCB with lock and key for connecting the discharge resister for periodical 10Hr discharge	1 No.	1 No.
23	The Battery voltage to be measure of MU1000C or equivalent for SCADA compatibility	1 No.	1 No.
24	Earth fault sensing	1 No.	1 No.
25	Battery DC Voltage low Sensing	1 No.	1 No.
26	Battery DC Voltage high sensing	1 No.	1 No.
27	Digital meters: - AC Moving iron Voltmeter of size 96 Sq.mm. with suitable selector switch & HRC fuses –	1 Set	1 Set
28	Digital meters: - AC Moving iron ammeter of size 96 Sq.mm. with suitable current transformer & selector Switch	1 Set	1 Set
29	AC mains under/over voltage circuit solid state sensing type	1 No.	1 No.
30	Space heater (80 W) with Thermostat with MCB	1 No.	1 No.
31	Cubicle Lamp of LED type with an ON/OFF switch and a fuse	1 No.	1 No.
32	3 pins 5 A sockets as convenience outlet with an On/Off switch and a fuse	1 No	1 No
33	Alarm Annunciation a) Load voltage high b) Over voltage, under voltage or output fail. c) Mains out of range d) System Overload e) Mains ON/Battery Discharge f) Temp. Compensation fail g) Battery Fail or No Battery h) Battery Isolated from the load i) DC Earth Leakage j) I/P MCCB Trip/Off k) FC & FCB O/P MCCB Trip/Off	1 No.	1 No.

	l) DCDB Incomer MCCB Trip/Off m) Rectifier Module fail All alarm circuits shall be provided with suitable delay to ensure that they do not operate to transient. Every alarm, condition shall be accompanied with an audio alarm with audio cut off facility. Potential free contacts two (one for alarm and one redundant) shall be provided for extension of alarms to centralized display.		
34	Microprocessor based Digital Controller form to suit SCADA Compatibility through MODBUS (Serial) Protocol. Controller shall have display feature consisting of following features: Float Voltage Boost Voltage Float Current Boost Current Load Voltage Load Current Battery Voltage Battery Current DC Leakage Additionally, Analog meter dedicated for monitoring of DC leakage to be provided.	1 No.	1 No.
35	Digital leakage current Indicator	1 No.	1 No.
36	Lamp indication to be provided whether battery charger is running on Float mode or Boost Mode.	1 No.	1 No.
37	Any item not specifically mentioned, but required for efficient working of the equipment	As applicable	As applicable

3.4 Arrangements

3.4.1 Trickle (Float) Charger

The trickle charger shall have arrangement for regulation of D.C. output voltage by

a. Automatic voltage regulation system

b. Shall be of thyristor control type with both 'auto/manual' control arrangement.

3.4.2 Quick (Boost) Charger

The quick charger shall be similar type as trickle charging equipment but shall have the following features.

a. Shall be provided with control arrangement for 'auto/manual' current regulation features, necessary for quick charging

b. Shall also have 'auto/manual' voltage control arrangement for use when the charger will be utilized as a trickle charger.

3.4.3 The 'Trickle' and 'Quick' charger shall be self-supporting cubicle type with front panels hinged and suitable for mounting instruments, incoming A.C (3-ph) circuit breaker with thermal and instantaneous releases relays, contactors and control switches etc. The panels shall have access from the backside also. These cubicles shall also house transformers, rectifiers and other equipment's, accessories, as stipulated in this specification.

3.5 **Design and Construction Details**

3.5.1 The battery chargers of 24V/70 Amp in N+1 configuration with ultimate capacity as per Type-1 and Type-2 shall be of SMPS type suitable for VRLA Batteries. The system shall consist of a Distribution / Switching / Alarms arrangement (DSA) and Float / Boost Rectifier-cum-Chargers (FC/FCB) in a rack. It shall employ modular configuration for flexible provision of DC Power. It shall employ menu driven Micro Processor Controlled Techniques for DSA as well as module for control, monitoring and alarm to achieve better reliability of the system. The SMPS battery chargers shall be capable of continuous operation with float voltage for Li-Ion batteries while supplying the constant DC load

3.5.2 The 'trickle' charger and 'quick' charger shall be complete with silicon controlled rectifier units, dry type air-cooled transformers, control electronics, smoothing filters etc. suitable for operation from 415V + 10%, 50 Hz + 5%, 3-ph A.C. supply. The charger output shall be stabilized to + 1% of set value for + 10% input voltage variations and 0-100% load variation.

3.5.3 The SMPS battery chargers shall have constant voltage characteristics throughout the range (from zero to full load) at the floating value of the voltage so as to keep the batteries fully charged but without harmful overcharge.

3.5.4 The battery charger shall have full-wave, Half-controlled thyristor control bridge rectifier circuit. The charger output voltage shall suit the battery offered. The float voltage shall be adjustable from 80% to 115% of nominal voltage. The boost voltage shall be adjustable from 80% to 135% of nominal voltage. Ripple voltage shall be less than 3% RMS voltage.

3.5.5 Each float charger shall be capable of floating each cell of the battery bank at the specified voltage and supplying specified float current continuously under normal system operation.

3.5.6 Under normal operation, the float charger shall be supplying the DC load current and at the same time trickle charge the station battery. When the battery voltage goes down considerably, automatic transfer arrangement shall be provided such that the battery is disconnected from the float charger and gets connected to the Boost charger. However, when battery is on boost charge, DC load shall be fed from the float charger. In addition, means shall be provided to ensure interruption free availability of control power from the battery whenever there is a power failure irrespective of whether the battery is on boost charge or float charge.

3.5.7 The selection of electronic components shall be used on ambient temperature of 50 degree Centigrade and shall be of worst-case design to ensure continuous and trouble-free service. The control electronics shall be built on plug in type glass epoxy printed circuit boards of modular design.

3.5.8 The maximum temperature, attained by any part of trickle charger and quick charger, when in service at site under continuous full load conditions shall not exceed the permissible limits as fixed by relevant standards and as corrected to site condition.

3.6 **Battery Charger Panel**

3.6.1 Charger Panels shall be rigid, self-supporting structures, completely assembled and totally enclosed cubicle type construction, made out of structural steel members with sheet steel-coverings.

3.6.2 The enclosure of the charger shall be made of CRCA sheet steel of thickness not less than 3 mm for load bearing members, 2 mm for door and non-load bearing members and 3 mm for gland plates. Panels shall be offered with base frame of 3.0 mm thick CRCA sheet, painted black all around, suitable for bolting/ welding/ grouting on to the foundation. Gaskets on doors and inter panel gaskets shall be of neoprene rubber.

3.6.3 The panel shall have hinged front and back doors with concealed type hinged locks and latches.

3.6.4 The panel shall have adequate cross –ventilation arrangement to avoid any undue rise in temperature.

3.6.5 All equipment’s and wiring used in the panel shall be tropicalized dust proof and vermin-proof.

3.6.6 Power wiring for the chargers shall be done with 1.1KV grade, heavy duty, single core, stranded copper conductor PVC insulated cables or suitable sized PVC sleeved copper bus bars. Control

wiring for the charger shall be done with 1.1KV grade PVC insulated copper wires of cross section 2.5 sq. mm for all control connection. Wire of 2.5 sq. mm cross section shall be used for control bus. All control wiring shall be ferruled.

3.6.7 Necessary terminals for grounding the panel with two separate earthing shall be arranged for bottom entry and suitable cable glands shall be provided for the cables.

3.6.8 Each charger panel shall incorporate all the necessary controls, Indications, interlocks, protective devices and timing features to ensure any operation. Provision shall be made with necessary contact / relays for annunciation in the event of alternating current power failures to the charger and automatic shutdown of the charger by over-voltage / current devices. Annunciation shall however be prevented when the charger is manually shutdown or when A.C. power supply is momentarily interrupted for adjustable period of 1 to 5 seconds.

3.6.9 The float and equalizer charging rates shall both be adjustable from the front of the charger control panel. Each charger shall be protected against any damage from over voltage/ load currents and shall be so designed that it can continuously deliver at least rated current output without operation of the protective over-load device for abnormal conditions of low battery voltage down to 19.2V (80%) of the rated voltage). But the chargers shall be disconnected from A.C. input supply through an over-voltage relay, if the input voltage exceeds 10% of the rated voltage of the equipment. Necessary selector switches for 'Trickle Charging' and 'Quick charging' shall be provided. There shall be 'make before break' type blocking Diodes and other equipment's to be shown in the drawing or otherwise found necessary for charging or otherwise found necessary for charging the battery without increasing the voltage beyond safe value across the load shall also be supplied by the tenderer.

3.6.10 The rectifier units of the chargers shall be capable of supplying an impulse load of 6/7 times its rated capacity. The trickle charger in conjunction with automatic voltage regulators shall have drooping characteristics, so as to transfer the load beyond its capacity to the battery.

3.6.11 The incoming and outgoing circuits shall be provided with MCCBs with static releases for overload, short circuit and earth fault protections. The incoming power supply to the chargers will be from two sources with a facility of changeover switch. The changeover facility shall be provided in the charger itself.

3.6.12 The battery circuit shall be provided with HRC fuse protection over a suitably rated load break isolator switch and reverse protection circuits.

3.6.13 Input volt meter and ammeter shall be of digital type and shall be 96 x 96 mm. Square. These meters shall be of accuracy class not less than 1.0 and shall be of flush mounting type with

required PTs and CTs and selector switches. Output voltmeter shall be digital, and ammeter shall be moving iron type and shall be 96 x 96 mm square. These meters shall be of accuracy class not less than 1.0 and shall be flush mounting type. The ammeter shall be Centre zero type for measurement of charging and discharging current from the battery.

3.6.14 Cluster LED lamps for indicating 'Input on' condition and 'Output on' condition, float status on / off, boost status on / off etc. shall be provided. Annunciation with audio visual alarms shall be provided for the following.

a. Input mains failure

b. Input phase failure

c. Input fuse failure

d. Rectifier fuse failure

e. Filter fuse failure

f. DC over voltage

g. DC under voltage

h. Output fuse failure

i. Charger over-load

j. Earth leakage

k. Alarm supply fuse failure

l. Charger trip

m. Output MCCB tripped

n. AC under voltage

o. Battery low condition

ACCEPT, TEST AND RESET push buttons shall be provided. 20% spare annunciation windows shall be provided.

3.6.15 Name Plate & Marking

Battery Charger shall be provided with durable and legible nameplates containing all technical parameters mounted on the front side of charger. Name plate for Battery Charger shall be embossed with "PO no. with date", "PROPERTY OF TPCODL, BHUBANESHWAR ", "MATERIAL CODE", along with the following information :

a. Name of manufacturer.

b. Serial Number

c. Rated voltage

d. Rated normal current in Amps.

e. Year & Month of Manufacture.

f. Warrantee Period

g. Applicable IS/IEC

Following points needs to be painted on the front side and shall be visible. Background shall be in yellow color.

(Front : Arial; size: 100; Polyurethane paint shall be used. Board formation shall be 100x200 mm)

Equipment Description- ……..

Rating- ……..

Make- ……

S.no- ……..

YOM-……

Equipment ID. -……. (It will be written by TPCODL)

Asset no- ……. (It will be written by TPCODL))

3.6.16 Any other item(s) not stipulated in this specification, but required for installation, operation and maintenance of the battery charger is / are included in the scope of supply without any extra charge to TPCODL.

3.7 **TESTS**

3.7.1 **Type Tests**

The bidder shall submit the Type Test reports along with the drawing for approval for the following type tests conducted on float cum boost charger as per relevant IS and IEC within five years from the date of opening of the bid

a. Measurement of voltage regulation / AVR regulation

b. Efficiency and power factor measurement test

c. Temperature rises test so as to determine the temperature rise of SCR, Transformer primary, Secondary and core, Diode, capacitor, choke and cabinet etc.

d. Measurement of insulation resistance.

e. AC input to earth

f. AC input to DC output

g. DC output to earth

h. Test for rectifier transformer

i. DC voltage current characteristic

j. High Voltage Tests.

k. Determination of regulation

l. Measurement of ripple

m. Reverse leakage test.

3.7.2 **Acceptance Tests**

Followings shall constitute the Acceptance tests which shall be tested by the purchaser's representative at the works of the manufacturer at the cost of the supplier (both for FC cum BC) for each charger. No sampling is allowed.

a. Measurement of voltage regulation / AVR Regulation

b. Efficiency and power factor measurement

c. Temperature rise test so as to determine the temperature rise of SCR, Transformer primary, secondary and core, diode, capacitor, choke and cabinet etc.

d. Measurement of insulation resistance.

e. AC input to earth

f. AC input to DC output

g. DC output to earth

h. Test for rectifier transformer (all relevant tests as per corresponding ISS)

i. DC voltage current characteristic

j. High voltage tests.

k. Determination of regulation.

l. Measurement of ripple

Tests for indications and alarms as per this specification

m. Tests for indicating instruments.

n. Determination of system set points.

o. Soft start test

N.B.: The supplier shall provide arrangements for monitoring the temperature across the elements, as stipulated above, continuously during the temperature rise test without disconnection of any of the temperature measuring devices across the hottest spot of each of the above elements. All other tests, as may be necessary to ensure that all equipment's are satisfactory shall also be carried out. In addition to the above tests, manufacturer's test certificates, vendor's test certificates for different equipment's, accessories, instruments etc. shall be submitted, whenever required by the purchaser.

3.8 **Drawings / Documents**

The tenderer shall submit the following drawings / documents for approval.

a. OGA of the battery chargers

b. General layout with overall dimensions

c. Electrical schematic diagram showing connections and controls.

d. Leaflets and technical literature giving detailed information of the panels offered.

The contractor shall submit the following drawings / documents in 7 (seven)copies within 15 (fifteen) days from the date of issue of the purchase order for purchaser's approval.

a. OGA of the battery chargers

b. General layout with overall dimensions marked along with sectional views showing cable entry position etc.

c. Rating calculations for transformer, rectifiers, diode, capacitor, inductor etc.

d. Detailed schematic and connection and control wiring diagram for all the equipment's.

e. Complete bill of materials.

f. Technical excerpts on operation.

g. The circuit diagram of charger including circuit diagrams of all cards to facilitate the maintenance of chargers.

3.9 Guaranteed Technical Particulars

The guaranteed technical particulars of this specification shall be furnished along with the tender. Any tender, lacking complete information in this respect is likely to be rejected.

3.10 Deviation from Specification

All deviations from the specification shall be separately listed in the technical deviation sheet, in the absence of which it will be presumed that the provisions of these specifications are complied with by the tenderer.

3.11 General Technical Requirements for Battery Charger

Sl. No.	Item Description	Functionality Expected	Bidder's Response
1	Manufacturer Name		
2	Model		
3	Type	Float & Float Cum Boost Charger for VRLA Type, full wave, full controlled type.	
4	Ratings	70 A Float cum Boost for 24V, 150 AH (Type-1) & 24V, 200 AH (Type-2) VRLA Type Battery	

5	AC Input i) Voltage ii) Frequency iii) Phase	FC & FCB 415 V AC ± 10% 50Hz ± 5% 3 – phase, 4 Wire		
6	Ampere Hour Capacity	Shall be in-line with applicable Battery System		
7	DC Output Voltage Settings Nominal Float	FC 24/27.25V (adj. By + 20%, - 5%)	BC 24/33.25V (adj. By + 2%, - 5%)	
8	Output Current Limit	70 Amp	70 Amp	
	Number of SMPS Modules	FC	FCB	
		N+1	N+1	
9	Power Conversion	AC to DC by means of three phase full wave, half controlled bridge rectifier consisting of thyristors and diodes.		
10	Voltage Regulation at Bridge output	+ 1% of set value for + 10% Input Voltage Variations, 0 - 100% Load Variation		
11	Ripple Voltage	Less than 3% RMS without battery connected, < 200 mV		
12	Efficiency	Better than 90% at full load		
	Power Factor at 50% and 100% Load	0.99 @ 50-100% Load		
	Load Regulation	±1%		
13	Protections			
a)	Input side	AC input MCCB & ELBS with input ON/OFF switch and fuses, contactor		
b)	Output side	DC output MCCB with output ON/OFF switch and fuses		
c)	Protection	Current limit protection, soft start features, surge suppressor. Fast semiconductor fuses for rectifier bridge.		
d)	Control Circuit	Fuses		
e)	Capacitor Circuit	Rectifier HRC fuses		
		Over-voltage cut-back		
		Charger overload / short circuit		
		Blocking diode		
f)	Mounting Type	Free standing floor mounting, Indoor & Outdoor application		
13	Controls & Switches	Followings Controls and Switches are required in the System: a. AC input source MCCBs with interlocking		

		b. DC output MCCB c. Auto/Manual float/boost mode selector switch. d. Float and boost voltage variable potentiometers. e. Manual voltage adjustment Potentiometer f. Test push button g. Reset push button h. Battery current adjustment potentiometers i. Heater's power supply switch j. Socket power supply switch		
14	Features	The following features are required in the systems: a. Soft start on DC side b. Class-F insulation for all magnetic. c. Automatic voltage regulation. d. Automatic changeover from float to boost and e. vice versa based on current, drawn by battery. f. Filter circuit to eliminate ripple. g. Charger current limit h. Separate battery path current limit. i. Built-in auto phase reversal of operation.		
15	METERS	F.C. (i) Input Voltmeter (ii) Input Ammeter (iii) Output Voltmeter (iv) Output Ammeter	B.C. i. Input Ammeter ii. Input Voltmeter iii. Output Voltmeter iv. Output Ammeter	
		Battery volt meter Battery ammeter Earth leakage ammeter		
16	Indications	Phase 'ON' lamps Output 'ON' lamp	Phase 'ON' lamps Output 'ON' lamp Charger 'ON' float Charger 'ON' boost	
17	Annunciation with audiovisual alarms	i. AC input mains failure ii. Input phase failure iii. AC under voltage iv. Input phase failure v. Rectifier fuse failure vi. Output fuse failure vii. Filter fuse failure viii. DC under voltage ix. DC over voltage		

		x. Charger trip xi. Capacitor fuse fail xii. Output MCCB tripped xiii. Charger over load xiv. Earth leakage xv. DC earth fault xvi. Alarm supply fuse failure xvii. failure viii. Battery low condition.		
Note: All the alarms shall be provided through electronic display module. Audio alarm through buzzer, visual indication through 10 mm LEDS & Alarm Ack/Reset and LED provision is through push buttons.				
18	Operating ambient temperature surrounding the panel	0^0 to 60^0 C		
19	Surrounding the panel Relative humidity	0-95% non-condensing		
20	PANEL (i) Protective grade (ii) Cooling (iii) Paint Thickness (iv) Colour Shade (v) Thickness of CR Sheet (vi) Cable Entry	 (i) IP – 42 (ii) Natural air-cooled (iii) 80 - 100 Micron (iv) RAL 7032 (v) 3 mm for load bearing parts & 2 mm for others (vi) Bottom		
21	MAGNETICS a. Average winding temperature rise over ambient temperature b. Insulation class c. Insulation breakdown voltage	 As per relevant ISS. 'F', 3 kV for 1 min withstand.		
22	User interface with controller	**Local Monitoring:** Web browser via Ethernet or WLAN WEB server Web UI with configurable access rights, login control and user profiles **Remote monitoring:** Web browser, REST, SNMP, Syslog, MODBUS, customer specific protocols via Ethernet, RS232, RS485 Remote alarming: Dry contacts / SNMP traps / SMS; dial-out together with modems / RTU		
23	CABLES	1100 V grade PVC insulated copper. Ferrules shall be provided for identification of connection.		

N.B.: -Besides the above general technical requirements, all other stipulations, as enumerated in this technical specification shall be followed. Any deviation should be clearly brought out with clear explanation.

Any extra feature/ equipment / instrument as necessary for operation and performance of the battery charger for the 24V battery set as per this specification shall be provided without any extra cost to TPCODL.

Battery bank shall be connected to battery charger MCCB/CB, therefore MCCB/CB to be considered in Battery charger for battery bank connection for safe disconnection of battery bank in case of O&M activity.

3.11.1 **General Features**

a. The Float charger, Float cum Boost charger with other Components and Integral DCDB shall be housed in a common cubicle with separate compartments for float & boost charger and for DCDB. The Chargers shall be indoor, floor mounted, self-supporting sheet metal enclosed cubicle type. The Bidder shall supply all necessary base frames, anchor bolts and hardware. The Charger shall be fabricated using cold rolled sheet steel shall not less than 1.6 mm and shall have folded type of construction. The panel frame shall be fabricated using cold rolled sheet steel of thickness not less than 3.0 mm (for load bearing members). Removable undrilled gland plates of at least 3.0 mm sheet steel and lugs for all cables shall be supplied by the Bidder. The lugs for cables shall be made of electrolytic copper with tin coat. The Charger shall have sufficient vermin proof. Ventilation louvers shall be backed with fine brass wire mesh.

b. All the door mounted equipment as well as equipment mounted inside the cabinet shall be provided with individual riveted /life lasting adhered labels with equipment description engraved.

c. All doors and covers shall be fitted with EPDM gaskets. The Chargers shall have hinged double leaf doors provided on front and/or backside for adequate access to the Charger internals. All the Charger cubicle doors shall be properly earthed. The degree of protection of Charger enclosure shall be at least IP-42.

d. Battery Charger shall be provided with earth bus bar of tinned copper flat, having minimum cross section 25x3 Sq. mm flat securely fixed along with base and provision on both the sides of earth bus for connecting purchaser’s earthing grid.

e. Redundancy arrangement for input AC supply: Dual source provision to be considered in battery charger. MCCB for individual source to be considered

f. Conformal coating on all electronics components to be considered.

g. All indicating instruments, control & selector switches and indicating lamps shall be mounted on the front side of the Charger.

h. Electronic equipment shall be of modular design consisting of plug in modules in standard 19 inches metallic racks with metallic card guides. The cards should be provided with proper handles. Card to card wiring should be preferably through a mother board. Unplanned jumping and track modifications are not permitted. Mechanical interlocks to prevent wrong insertion of cards should be provided. Each card shall have its junction and test points identified. Maintenance aids such as extension printed wiring boards and jumper leads shall be provided.

i. The layout of Charger components shall be such that their heat losses do not give rise to excessive temperature within the Charger panel surface. Operating temperature range shall be minus 5°C to plus 60°C. Location of the electronic modules will be such that temperature rise of the location, in no case, will exceed 10 °C over ambient air temperature outside the Charger.

j. The electronic control circuitry should have built in feature of soft start so that whenever the charger is switched on, the output voltage should increase gradually.

k. The float section of the charger shall be compatible to operate in auto (fully automatic) as well as manual mode with a provision of selection through Auto/Manual switch and all related components & scheme

l. Normally the float charger shall operate in parallel with the 24 V, battery set and the load. The float charger shall supply the DC loads of the sub-station and also provide the trickle charge for keeping the battery set floating totaling up to full capacity. For this condition, the float charger shall be designed to trickle charge all the cells between 21.7 V to 27 V and supply DC load of the sub-station, keeping the load bus-bar voltage approximately at rated voltage of DC load components by using dropper diodes.

m. The boost charger and the float charger shall be so interlocked electrically that during boost charging of the battery, the float charger will supply the DC constant load without supplying to the battery, and at the same time will be in parallel with the battery through a reverse current blocking diode at a suitable tapping. One DC contactor may be incorporated which shall get

engaged through N/C contact of the contactor on AC side of the boost charger. In case of failure of AC supply, this contactor shall connect the entire battery supply to the load through one of its N/O contacts automatically without any interruption of DC supply even of a momentary nature. Under no circumstances the voltage across lower tapped terminals shall exceed (+) 10% or fall below (-) 15% of the rated voltage.

n. Suitable Surge Protection Devices must be used for voltage surge protection.

o. Charger Output: Suitable ripple filtering circuits shall be provided to give a smooth DC output. The ripple content, without the battery connected shall be limited to less than 3% on resistive load. The DC output shall be free from switching surges, transients, etc.

p. Locking facilities shall be provided as following:

- For locking Trickle/Boost selector switch in the trickle position only. This would be used for having key mechanical interlock between Trickle/Boost selector switch and isolator in D.C. distribution board which is being procured separately by the Owner.
- The Charger enclosure door locking requirements shall be met by the application of padlocks. Padlocking arrangement shall allow ready insertion of the padlock shackle but shall not permit excessive movement of the locked parts with the padlock in position.

3.11.2 Wiring

- Each Charger shall be furnished completely wired up to power cable lugs and terminal blocks ready for external connection. The power wiring shall be carried out with 1.1 KV grade PVC insulated copper cables conforming to IS:1554 (Part-I). The control wiring shall be of 1.1KV grade PVC insulated stranded copper conductors of 2.5sq.mm. Conforming to IS: 694. Control wiring terminating at electronic cards shall not be less than 1.0 sq. mm. Control terminal shall be suitable for connecting two wires with 2.5 sq.mm. Stranded copper conductors. All terminals shall be numbered for ease of connections and identification. At least 20% spare terminals shall be provided for circuits. The wiring shall have fire resistant (FRLSH) properties.
- Power and control wiring within panels shall be kept separate. Any terminal or metal work which remains alive at greater than 415 V, when panel door is opened, shall be fully protected by shrouding. All hardware such as screws nuts, studs, washers shall be of brass and no ferrous parts shall be used in electrical circuitry control / power.
- An air clearance of at least ten (10) mm shall be maintained throughout all circuits, except low

voltage electronic circuits, right up to the terminal lugs. Whenever this clearance is not available, the live parts should be insulated or shrouded.

3.11.3 **AC Terminations**

- The input terminal should be single phase or three phases as the case may be cleared marked as R Y B and N and for AC three phase, L and N for AC single phase.AC input termination shall be suitably protected against the accidental touch/contact with the working staff for their protection and shall also have clear and prominent be “Danger” marking.
- Screening shall be provided between AC and DC components to prevent accidents. The AC input connection to the rectifier module shall be by means of locking type plug and socket arrangement.
- All the connection between distribution and modules shall be through proper rated cables only. Fuses and circuit breakers for each module shall be easily accessible and properly rated.

3.11.4 **DC Terminations**

- The output of each rectifier in the negative load shall be taken through full rated ISI marked MCBs. All the AC, DC control & alarm cabling shall be supplied with the rack. All DC +ve and - ve leads shall be clearly marked.

3.11.5 **Battery Temperature Compensation**

- The charger shall be provided with the appropriate circuitry to interface with the temperature probe assembly. With the probe, the charger shall automatically compensate gassing and constant voltage setting inversely proportional to the probe’s temp/ battery ambient temp., so that over charging at high temperature and under charging at low temperature can be prevented.

3.11.6 **MCB**

- Suitable rated MCBs are to be considered. MCB rating shall be chosen by the Bidder depending on the circuit requirement. All MCBs in the chargers shall be monitored. MCB OFF/failure annunciation shall be provided on the OFF/failure of any MCB.

3.11.7 **Blocking Arrangements**

- Blocking arrangement shall be provided in the positive pole of the output circuit of the charger to prevent current flow from the DC battery into the charger.

3.11.8 **Radio Interference**

- The equipment shall be efficiently screened against interference to radio and also other communication equipment, which may be installed in the same building. All sources of noise shall be filtered if necessary, with suppressors generally in accordant with relevant standards.

3.11.9 **Additional Features Required:**

- The SMPS modules should be hot swappable modules.
- The spare modules should be easily replaced without any shut downs & there should be no downtime of the system.
- Despite a breakdown in the Monitoring unit or disturbances on bus, system stability should not affect.
- Less voltage drops in the output. (as per voltage regulation)
- Selective over voltage shut down
- Provision for Battery Capacity Test.
- No requirement of additional hardware for changing of parameters at site.
- Settable Time delay & hysteresis for each alarm
- Event history records (min. 100 records storage) with time stamp for fault analysis
- Remote monitoring of parameters
- DCDB feeder ON & OFF status monitoring through controller display feature should be available.
- DCDB earth fault monitoring through controller display feature to be added

3.11.10 **Following are the minimum Mandatory signal required for integration with SCADA/DMS/OMS System:**

Measurement Signals

- DC load voltage
- Load current
- Float Current

- Float cum Boost Current

Alarm Signals

- DC earth Leakage
- UV Alarm
- OV Alarm
- Main-1 Ac fail
- Main-2 AC fail
- FC Charger fail
- FCBC charger fail
- Major card/components failure

Battery Charger with DCDB shall be integrated with TPCODL SCADA over Modbus-RTU or TCP/IP protocol. If any kind of software required for configuration, then same to be supplied by the bidder. Kindly note that voltage exact value to be mapped in SCADA. No calculation formula is acceptable.

Vendor shall depute their service engineer during installation and commissioning stage for required checks and assist TPCODL in commissioning of Battery Charger.

3.12 Battery Charger Controller

This part of the specification covers the technical requirements of design, Engineering, manufacture, stage testing, inspection and testing before dispatch, packing, forwarding, delivery at site and integration of Battery Charger Controller with proposed RTU for remote monitoring and control of DCDB system from Purchaser's Remote SCADA Systems, the same shall be based with suitable accessories for Indoor/Outdoor installation, complete with all fittings accessories and associated mandatory auxiliary equipment which are required for efficient and trouble-free operation.

The scope includes supply of hardware/software required for integration with existing Sub-Station Automation System for remote monitoring of proposed charger and battery system over Industry Standard Open protocols (e.g. IEC 61850, Modbus (RTU/TCP) from Remote SCADA System of the Purchaser's. The Scope also covers point to point testing of each site with SCADA

System.

The proposed controller shall have adequate number of Digital Input / Output system, Analog Input / Output System as per the I/O list attached with this specification in Section E. Bidder shall consider suitable transducers as per the site requirement for taking Voltage and Current signals from battery charger.

3.12.1 General Technical Requirements

3.12.1.1 The proposed controller shall be suitable for the harsh environment mentioned elsewhere in this RFP. All the controller module shall be mandatorily with conformal coating.

3.12.1.2 Controller should be robust and shall be mounted on Charger panel. If any mounting arrangement are required for proper fixing, same will be in bidder's scope. All the wiring inside charger and requirement of electrical accessories will be in the scope of the bidder. Any Hardware / Software required for integration of the controller with substation RTU will be in the scope of the bidder.

3.12.1.3 RS485 communication will be in scope of the Bidder. Bidder has to supply Serial Communication Cable (i.e. Armored twisted pair communication cable (4P X 0.36 mm2), for integration of the controller with RTU, the required length of the communication cable will be as per the site requirement.

All functional capability described herein shall be provided by the bidder even if a function is not initially implemented. As a minimum, the Controller shall be capable of performing the following functions:

3.12.1.4 The proposed Controller, I/O and Interfacing modules shall be of the same family of RTU or Embedded, industrial grade system with high availability & reliability. Controller hardware shall be easily scalable for expansion and to integrate IEDs in future on open protocols.

3.12.1.5 The controller shall have multi-protocol support capability, adaptable for customization and additional protocols and Multi master communication capability.

3.12.1.6 The Controller shall support a wide range of Server/Client protocols including IEC61850 (ED1 & ED2 edition), Modbus - RTU, Modbus - TCP/IP (Master).

3.12.1.7 The Controller shall support Physical I/O tags and shall support integration of IEDs on Open Protocols as mentioned above. Bidder to consider the hardware such as I/O peripheral, Serial Ports, Communication processors, Converters etc., in the Controller accordingly.

3.12.1.8 The proposed Controller shall be integrated with Purchaser's redundant RTU.

3.12.1.9 Shall support IEC 61131 based programming.

3.12.1.10 Web Server functionality to monitor and configure the Controller by authorized users (AAA functionality).

3.12.1.11 Should provide latest Microsoft Windows based maintenance and configuration tools. The tools should have functionality of both remote and local access.

3.12.1.12 Time synchronization based on SNTP (Server/ Client) and Protocol specific synchronization. The Controller shall accept minimum two independent sources for time synchronization over SNTP/Protocol specific Synchronization.

3.12.1.13 Controller shall support SNMP protocol for device monitoring and management from Purchaser's Network Management System.

3.12.1.14 Controller shall support configuration File Upload and Download from the Engineering Station (Configuration Laptop), functionality shall support both Local & Remote configuration.

3.12.1.15 Controller communication protocol shall be configured to report analog & Status changes by exception to master stations. However, Controller shall support periodic reporting of analog data and periodicity shall be configurable from 1 sec to 1 hour. Digital status shall have higher priority than the analog data. In addition, analog values shall also be reported to Master station by exception on violation of a defined threshold limit.

3.12.1.16 The XML based Substation Configuration Description Language (SCL) of IEC 61850 configuration interfaces shall allow information to be shared between the various configuration tools, reducing the overall engineering time.

3.12.1.17 User friendly on-line health and data monitoring facility shall be provided to maintenance engineer for monitoring/analyzing the real time status of the process, program logic from the engineering station (Configuration tool – Laptop) from Local and Remote.

3.12.1.18 The system shall comprise of features namely failsafe control (i.e. check-before-execute, selection timeout etc.), Interlock & Sequential Logic Control system, Sequence of Event

Recording (SER), time synchronization through SNTP server or through the Master (Main & Standby).

3.12.1.19 In case of power supply failure, auto start-up and restoration of the Controller shall be possible without manual intervention.

3.12.1.20 All the cards/modules of the Controller must have conformal coating for protection against harsh environments.

3.12.1.21 Internal battery backup to hold data in SOE buffer with time & date in case of failure of supply.

3.12.1.22 The proposed Controller shall be KEMA Certified or by equivalent certification body like NABL /CPRI/International Accredited Lab.

3.12.1.23 Continuous self-supervision function with self-diagnostic feature shall be included.

3.12.1.24 Controller & Communication Redundancy

- The Controller shall communicate to both Main and Standby Purchaser's RTU.
- The failover process should cause the assignment of all the functions of the failed unit to the healthy unit. The changeover between the two redundant units shall be transparent and shall not require any manual intervention. The changeover process of the Controller shall be bump less and with no data loss.

3.12.1.25 **Communication**

3.12.1.25.1 **Ports**

- Controller shall have appropriate number of ports as per the protocol proposed and providing data to both Main and Standby RTU.

3.12.1.25.2 **Protocols**

- The communication protocol of Controller should support IEC 61850 Ed.1 & 2 (latest), MODBUS (Serial and TCP/IP) shall be supported. The RTU shall meet the IEC 61850 standard in every respect and interoperability with other manufactures IEDs and tools shall be verified.
- Time synchronization over SNTP and Communication protocol from Master.
- SNMP (v1, v2c and v3) for Health monitoring of the Hardware.

3.12.1.26 **Algorithm and Logic**

- The Controller shall be based on advanced and proven algorithms and an easy and efficient upgrade of the Controller functionality shall be possible.
- The Controller shall support IEC61131.

3.12.1.27 **Self-Supervision**

- The Controller shall have extensive self-supervision including all functional module and communication channel.
- The Controller shall have LEDs for healthiness / error indication
- Controller shall have the facility to generate & download the log files for maintenance and troubleshooting.
- In case of restoration of communication links, power supply after failure, the software along with hardware shall be capable of automatically synchronizing with the remaining system without any manual intervention.
- It could be possible to re-boot the Controller through the LAN/WAN from a remote location.

3.12.1.28 **Event Recording pertaining to Controller**

- The Controller shall support event recorder that can handle up to 500 time tagged events. Events shall be stored in non-volatile memory. In case of failure of Controller or communication channel, the recorded events shall be communicated to the master as soon as communication is restored after failure.
- The Controller shall have an internal clock with the stability of minimum 10 ppm or better.

  It shall be possible to retrieve the recorded event on the Purchaser's SCADA system.

3.12.1.29 **Power Supply**

- The Controller shall be powered from the 24 V DC Power Supply. The Controller shall accept power from the DC system with the following characteristics:
- Nominal Voltage of 24V DC with operation between 18 and 30 VDC. The voltage may vary during normal operation between these limits with a duration not less than 1 msec.
- Reverse polarity protection.

- The Controller shall operate with grounded input power from purchaser
- The Controller shall have adequate protection against reversed polarity, over current and under voltage conditions.
- Each Input / Output Supply within the panel shall be through power supply distribution module with MCBs with NO contacts (for supply monitoring).

3.12.1.30 **Reliability**

Reliability of the equipment's offered shall be better than 99.99% per year availability for overall end equipment. The relatability and availability calculation shall be provided with engineering document for approval.

3.13 DC Distribution Board (DCDB)

The DCDB shall be floor mounting, integral to battery charger panel. Non compartmentalized, separate partition shall be provided between battery charger and DCDB. It shall have Moving coil DC voltmeter of size 96 sq.mm with HRC fuse 0-300V and Incoming Feeder 300A DC, Copper Bus-bar, MCCB: 2 Nos., Outgoing Feeder 25A DC MCB: 15 Nos. with Feeder 'ON' LED indication.

Sl. No.	Item Description	Functionality Expected	Bidder's Response
	DC Distribution Board		
a)	Feature of DCDB feeder ON/OFF status monitoring through controller display	Required	
b)	Feature of DCDB earth fault monitoring through controller display	Required	
c)	I/C feeder comprising of copper busbar double pole DC MCCB - 300 A	2 Nos.	
d)	O/G feeder comprising of double pole 25A MCB	15 Nos.	
e)	Moving coil DC voltmeter of size 96 sq. mm with HRC fuse 0-300 V	1 No.	
f)	Moving coil DC ammeter of size 96 sq. mm; 0-150 Amp	1 No.	
g)	24V/60A Copper bus bar (size to be mentioned by bidder)	Copper Bus Bar	
h)	Dropper Diode scheme	Required	

i)	Surge Protection device (SPD) class	Type # 1	
j)	Earthing bus bar	25 x 3 sq. mm tinned copper	
k)	Cooling	Speed Regulated Fan Cooled	
l)	Digital Leakage Current Indicator	Yes	
m)	Lamp indication to be provided whether battery charger is running on Float mode or Boost Mode	Yes	

Chapter # 3

Communication & Power Cables

4.0 Technical Specification for Cables

4.1 SCOPE

This part of the specification covers the technical requirements of design, Engineering, manufacture, stage testing, inspection and testing before dispatch, packing, forwarding, delivery at site the PVC, armoured, copper control cables for installation in substations

The material offered shall have been successfully type tested during last five years on the date of bid opening. The front page of type test report showing the evidence of successful type test of the items asked for in this Specification shall be uploaded with the signature of bidder. The full text of the type test report is to be submitted along with the technical proposal.

The control cables shall conform in all respects to highest standards of engineering, design, workmanship in accordance to this specification and the latest revisions of relevant standards, mentioned below.

4.2 STANDARDS IEC / ISO Indian Standard Title

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

Sl. No.	Standard Code		Brief Description of the Codes
1	IEC 811	IS-18-10810:1982	Testing cables
2	IEC 502	IS - 1554:1988 (Part 1)	PVC Cables 1100V
3	IEC 227	IS - 5819:1970	Short circuit ratings for PVC cables
4	IEC 228	IS-8130:1984	Conductors for insulated cables
5	IEC 287		Calculation of the continuous current rating of cables.
6	IEC 540	IS - 5831: 1984	Test Methods for insulation and sheaths of electric cables and cords IEC 287
7		IS - 3975: 1979	Mild steel wires, strips and tapes for armouring 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 TPCODL. The Bidder shall furnish a copy of the alternative standard proposed along with technical proposal. 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

a. Indian Standards

b. IEC

This list is not to be considered exhaustive and reference to a standard or recommendation in this Specification does not relieve the Bidder of the necessity of providing the goods complying with other relevant standards or recommendations.

4.3 **Technical Details**

4.3.1 1.1 kV POLYVINYL CHLORIDE (PVC) INSULATED CABLES All control cables to be used shall be armored PVC type. The outer sheath of control cable shall be Polyvinyl chloride (PVC) type ST-2 of IS 5831.

4.3.2 Rated Voltage and Temperature Control and Panel Wiring Cables (PVC Insulated)

The conductor shall be of round stranded plain copper wires complying with IS - 8130:1984/ IEC 228.

N.B. - Conductor screening not required in this case.

4.3.3 **Insulation**

The insulation shall be of Polyvinyl Chloride (PVC) compound. 'Heat Resisting' Type C for the Control and Panel Wiring cables. Both shall conform to the requirements of IS - 5831: 1984.

Type of Insulation	Normal Continuous Operation	Short Circuit Operation
General Purpose	70^0 C	160^0 C
Heat Resisting	85°C	160°C

The PVC insulation shall be applied by extrusion and the average thickness of insulation 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.

Insulation Screening not required.

Core Identification and Laying up of Cores.

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.

4.3.4 **Inner Sheath**

The laid-up 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.

The outer serving shall incorporate an effective anti-termite barrier and shall be capable of withstanding a 10 kV DC test voltage for five minutes after installation and annually thereafter.

Current ratings shall be calculated in accordance with IEC 287 "Calculation of the continuous current rating of cables with 100% load factor".

4.3.5 **Conductor Sizes**

The following shall be used for Control and Panel Wiring:

The no. of Cores & Sizes of the Control Cable with flexible Copper Wires shall be 4 Core, 7 Core, 10 Core, 12 Core and 19 Core, 24 Core etc. There shall be one single core copper cable of 16 sq. mm size for earth wire. All panel wiring shall be done by 0.5 mm2 for digital inputs, 1.5 mm2 digital outputs, 1.0 mm2 for Analog Inputs, 2.5 mm2 for CT, 4 mm2 for PT, CVT, AC & DC Supply connection.

4P X 0.36 mm2 armoured, pair shielded, Overall shielded multistrand serial communication cable for DC Controller devices.

Bidder shall consider the cable size, number of conductors as per the site requirement and as mentioned in the indicative BOM.

4.3.6 **Cable Drum Length**

The cable shall be supplied in 500 meter lengths or more but with prior approval for the owner.

4.3.7 **Cable Identification**

The manufacturer's and Owner'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 do on the outer sheath. The alphanumerical character size shall be not less than 20% of the circumference of the cable and be legible.

4.3.8 **Sampling of Cables**

4.3.8.1 **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.

4.3.8.2 **Scale of Sampling**

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

4.3.8.3 **Sampling Rates**

The number of samples to be selected shall be as follows:

Number of Drums to be taken as samples	Number of Drums to be taken as samples
Up to 25	3
26 to 50	5
51 to 100	8
101 to 300	13
301 and above	20

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.

4.3.9 **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 the lot shall be declared as conforming to the requirements of acceptance test.

4.3.10 **TESTS ON 1.1 KV PVC INSULATED Armored Cable**

4.3.10.1 **Type Tests**

Certification of type tests already completed by independent test laboratories shall be presented with 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 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
(b)	Resistance test	IS-8130: 1984/IEC 502
(c)	Tests for thickness of insulation and sheath	IS-5831:1984/IEC 540
(d)	Physical tests of Insulation Tensile strength & elongation at break	IS-5831:1984/IEC 540
	Ageing in air oven	IS-5831:1984/IEC 540
	Hot test	IS-5831:1984/IEC 540
	Shrinkage test	IS-5831:1984/IEC 540
	Water absorption (Gravimetric)	IS-5831:1984/IEC 540
(e)	Physical tests for outer sheath	
(f)	Tensile strength and elongation at break	IS-5831: 1984/IEC 540
(g)	Ageing in air oven	IS-5 831: 1984/IEC 540
(h)	Shrinkage test	IS-5831: 1984/IEC 540

(i)	Hot deformation	IS-5831: 1984/IEC 540
(j)	Loss of mass in air oven	IS-5831: 1984/IEC540
(k)	Heat shock	IS-5831: 1984/IEC540
(l)	Thermal stability	IS-5831: 1984/IEC540 IS-5831: 1984
(m)	Insulation resistance test	IS-8130:1984/IEC502
(n)	Volume resistivity	As per IS / IEC
(o)	High voltage test	As per IS / IEC
(p)	Flammability test	As per IS / IEC

4.4 **Acceptance Tests**

The following shall constitute acceptance tests:

- Tensile test (Aluminum)
- 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 High voltage test
- Insulation resistance (volume resistivity) test
- PVC insulation only

** Test to be completed on full drum of cable

4.5 **Routine Tests**

Routine tests shall be carried out on all 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.

a. Conductor resistance test

b. High voltage test

c. Test to be completed on full drum of cable

4.6 **DETAILS OF TESTS**

4.7 **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.

4.8 **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 millimeters 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.

4.9 **Dielectric Power Factor Test**

Tan δ as a Function of Voltage

For cables of rated voltage 1.1 kV and above the measured value of tan δ at up shall not exceed 0.004 and the increment of tan δ between 0.5 up and 2 up shall not be more than 0.002.

4.10 **High Voltage Test**

4.10.1 **For 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.

4.10.2 **Routine Test**

For 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. 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.

4.10.3 **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 (uncharged) from the lower edge of the top clamp shall be at least 50mm.

4.11 **Control / LV Wiring Accessories**

4.11.1 **Terminations**

Control wire terminations shall be made with solder less crimping type and tinned copper lugs which firmly grip the conductor. Insulated sleeves shall be provided at all the wire termination. Engraved core identification plastic ferrules marked to correspond with panel wiring diagram shall be fitted at both ends of each wire. Ferrules shall fit tightly on the wire and shall not fall off when the wire is disconnected from terminal blocks. All wires directly connected to trip circuit breaker or device shall be distinguished by the addition of red coloured unlettered ferrule. Numbers 6 and 9 shall not be included for ferrules purposes except where underlined and identified as 6 and 9.

Control cable terminals shall be provided with adequate size crimp type lugs. The lugs shall be applied with the correct tool, which shall be regularly checked for correct calibration. Bi-

metallic joints between the terminals and lugs shall be provided where necessary Terminals shall be marked with the phase colour in a clear and permanent manner. A removable gland plate shall be provided by the contractor at every cable entry to mechanism boxes, cabinets and kiosks. The Contractor shall be responsible for drilling the cable gland plate to the required size.

4.12 General Particulars and Guarantees

4.12.1 Compliance with Specification

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

4.13 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.

4.14 Non-Conforming Product

The Project Manager shall retain responsibility for decisions regarding acceptance, modification or rejection of non-conforming items.

4.15 Inspection and Testing

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.

TPCODL 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.

Type tests shall be carried out at an independent testing laboratory or be witnessed by a representative of such laboratory or some other representative acceptable to the Project Manager. Routine and acceptance tests shall be carried out by the Bidder 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 TPCODL.

All costs in connection with the testing, including any necessary re-testing, shall be borne by the Bidder, who shall provide the TPCODL with all the test facilities which the latter may require, free of charge.

4.16 **Guarantee**

The Bidder shall guarantee the following:

a. Quality and strength of materials used;

b. Satisfactory operation during the guarantee period of one year from the date of commissioning, or 18 months from the date of acceptance of the equipment by the Project Manager following delivery, whichever is the earlier.

c. Performance figures as supplied by the Bidder in the schedule of guaranteed particulars.

4.17 **Packing and Shipping**

4.17.1 **Packing**

The cable shall be wound on strong drums or reels 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. In the case of steel drums adequate precautions shall be taken to prevent damage being caused by direct contact between the cable sheath and the steel. These precautions shall be subject to the approval of the Project Manager.

If wooden drums are used, then the wood shall be treated to prevent deterioration from attack by termites and fungi.

Each drum or reel shall carry or be marked with the following information:

a. Individual serial number

b. Owner's name

c. Destination

d. Contract Number

e. Manufacturer's Name

f. Year of Manufacture

g. Cable Size and Type

h. Length of Conductor (meters)

i. Net and Gross Mass of Conductor (kg)

j. All necessary slinging and stacking instructions.

k. Destination:

i. Contractor's name:

ii. Name and address of Contractor's agent in Orissa:

iii. Country of origin:

The direction of rolling as indicated by an arrow shall be marked on a flange.

4.17.2 **Storage**

The site selected for the storage of cable drums shall be well drained and preferably have a concrete/firm surface which will prevent the drums sinking into the ground or being subjected to excess water thus causing flange rot.

All drums shall be stood on battens, in the upright position, and in such a manner to allow enough space between them for adequate air circulation. During storage the drums shall be rotated 90° every three months. In no instances shall the drums be stored "flat" on their flanges or one on top of each other.

4.18 **Hazardous substances**

The Bidder shall submit safety data sheets in a form to be agreed for all hazardous substances used with the equipment. The Bidder shall give an assurance that there are no other substances classified as hazardous in the equipment supplied. The Bidder shall accept responsibility for the disposal of such hazardous substances, should any be found. The Bidder shall be responsible for any injuries resulting from hazardous substances due to noncompliance with these requirements.

4.19 **Spare Parts and Special Tools**

The Bidder shall provide prices for spare conductor, joints and termination equipment. The TPCODL may order all or any of the spare parts listed at the time of contract award and the spare parts so ordered shall be supplied as part of the definite works.

A spare parts catalogue with price list shall be provided for the various cables, joints and termination equipment and this shall form part of the drawings and literature to be supplied. Any spare apparatus, parts or tools shall be subject to the same specification, tests and conditions as similar material supplied under the Contract.

They shall be strictly interchangeable and suitable for use in place of the corresponding parts supplied with the equipment and must be suitably marked and numbered for identification. Spare parts shall be delivered suitably packed and treated for long periods in storage. Each pack shall be clearly and indelibly marked with its contents, including a designation number corresponding to the spare parts list in the installation and maintenance instructions.

End of Section - B

Document Title: DC System for 33/11 kV Primary Substations

Document No: A&T/2021/SPEC-03/PSS DC SYSTEM

SECTION – C

SCHEDULES

TP CENTRAL ODISHA DISTRIBUTION LIMITED
(A Tata Power & Odisha Govt. Joint Venture)
2nd Floor, IDCO Tower, Janpath, Bhubaneswar, Odisha 751022

Revision	Date	Description	Approvals		
			Prepared By	Checked By	Approved By
R0	24th Dec 2021	Released for Procurement	TKB/GSB	AKA	RKR

Section – C

SCHEDULES

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C1 - SCHEDULE OF QUANTITIES AND PRICES

SUPPLY:

Sr. No.	Description	Qty. Set / Nos.	Unit Price (Rs.)	Item Price (Rs.)

SERVICES:	

Seal of the Company

Signature

Designation

Note: Please Refer Indicative Bill of Material for Schedule of Quantities and Prices attached in Excel Format with this Specification. However, bidder shall derive the detailed BOM based on the proposed solution in the same Excel format and submit along with the proposal.

C2- PROJECT TIME SCHEDULE

Seal of the Company

Signature

Designation

Note: The bidder shall indicate schedule of milestones and attach/furnish a detailed bar chart identifying Purchaser's inputs.

C3- SCHEDULE OF DRAWINGS & DOCUMENT SUBMISSION

As part of the proposal, the BIDDER shall furnish the schedule of Drawing/Document submission

Sr. No.	Title of Drawing/Document	Target Date of submission	For Information/Review/Approval	Remarks
1.0				
1.1				
1.2				
2.0				
2.1				
2.2				
3.0				
3.1				
3.2				
4.0				
4.1				
4.2				
5.0				
5.1				
5.2				

Seal of the Company

Signature

Designation

Note: The bidder shall list out all relevant Drawings / Documents as mentioned in Section-D.

C4- SCHEDULE OF MANDATORY SPARES

As part of the proposal, the BIDDER shall indicate below the list of recommended spares for Ten Years (10 years) of trouble free operation of the equipment/system offered.

Sr. No.	Equipment Tag No.	HSN Code	Description of Spare	Material of Construction	Part No.	Quantity recommended per unit of equipment	Unit Price	Total Price	Delivery period from date of LOI	Remarks

Seal of the Company

Signature

Designation

C5 - SCHEDULE OF SPECIAL ERECTION/MAINTENANCE TOOLS & TACKLES

As part of the proposal, the BIDDER shall indicate below, the list of erection/maintenance tools & tackles offered by him.

Sr. No.	Description of Spare	Quantity recommended per unit of equipment	Unit Price	Total Price	Delivery period from Date of LOI	Remarks

Seal of the Company

Signature

Designation

C6 - SCHEDULE OF PLACES OF MANUFACTURE, TESTS & INSPECTION

For major equipment / systems, the Bidder shall indicate the name of the Manufacturer / Subcontractor and place of test and inspection.

Item of Equipment	Manufacturer / Subcontractor	Place of Testing & Inspection

Seal of the Company

Signature

Designation

C7- SCHEDULE OF RECOMMENDED SPARES

As part of the proposal, the BIDDER shall indicate below the list of recommended spares for Ten Years (10 Years) of trouble free operation of the equipment/system offered by him.

Sr. No.	Equipment Tag no.	Description of Spare	Material of Construction	Part No.	HSN Code	Quantity recommended per unit of equipment	Unit Price	Total Price	Delivery period from date of LOI	Remarks

Seal of the Company

Signature

Designation

C8 – Manufacturer's Authorization

(To be obtained from all OEMs)

Date: _____

Bid Reference No.: _____

To: _____

WHEREAS_____ who are official manufacturers of _____ having factories at _____ do hereby authorize _____ to submit a Bid in relation to the invitation for Bids indicated above, the purpose of which is to provide the following Goods, manufactured by us _____ and to subsequently negotiate and sign the Contract.

We hereby extend our full Guarantee and Warranty in accordance with relevant Clauses mentioned in the Bid document (**GCC, Section-A** of Technical Specification), with respect to the Goods offered by the above firm in reply to this invitation for Bids.

Name: _____

In the Capacity of: _____

Signed: _____

Duly Authorized to sign the Authorization for and behalf of _____

Date: _____

Note: The bidder shall submit duly filled Manufacturer's Authorization letter from the respective OEMs for the Supply and Services rendered to meet the required functionalities mentioned in the RFP.

C9 – Undertaking for Presence in India

I hereby declare that <Name of the Bidder>, has Design/Engineering/Testing/Support and Service facility in India as on _____ (i.e., release date of Bid).

The address of the facilities is provided hereunder

_____

_____

_____

Signature of Authorized Signatory :

Full Name :

Address :

Phone Number :

Email Id :

Note: Necessary proof of incorporation/registration shall be submitted along with the Bid.

End of Section-C

Document Title: DC System for 33/11kV Primary Substation

Document No: A&T/2021/SPEC-03/PSS DC SYSTEM

SECTION – D

DRAWINGS & DOCUMENTS

TP CENTRAL ODISHA DISTRIBUTION LIMITED
(A Tata Power & Odisha Govt. Joint Venture)
2nd Floor, IDCO Tower, Janpath, Bhubaneswar, Odisha 751022

Revision	Date	Description	Approvals		
			Prepared By	Checked By	Approved By
R0	24th Dec 2021	Released for Procurement	TKB/GSB	AKA	RKR

Section – D

Drawings & Documents

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1.0 Tender Purpose

1.1 **Mandatory documents required along with the Bid**

1.1.1 Duly signed copy of TENDER as an acceptance to all terms and conditions as mentioned in this tender.

1.1.2 **Bidder and Sub-Vendors - Company Statistics**

Details	Bidder Response
Bidder's Name	
Address	
Contact (s), Title (s), Telephone (s), E-mail id (s)	
Name of the Chairman/ MD/ CEO/ Partners	
Nature of Ownership	
Date of Incorporation of Company/Entity	
Headquarter Location	
Other Office Locations, Functions and Personnel Strength	
1) Number of Employees by Function 2) Implementation 3) Sales 4) Support 5) Quality Assurance 6) Administrative 7) Management	
Size of Team for the Proposed Solution	
Location of Support Centers for Proposed Solution	
Other Businesses	

Table # 1: Bidder & Sub-Vendors – Company Statistics

Similarly, Bidder to submit the above details of all sub-vendors.

1.1.3 Bidder should depict complete understanding of the as-is system of the Utility based on the information provided in the Bid Document. It should also require listing down all the deliverables that has been planned as a part of the overall project with timelines.

1.1.4 Submission of documents as mentioned in Pre-Qualification Requirement

1.1.5 Technical Literature / GTP / Type Test Reports etc.

1.1.6 Details of all databases proposed and its relationship with application. Data flow diagram with entity relationship shall be submitted for all applications. Bidder shall clearly mention the list of application which are required to build data models manually.

1.1.7 GTP to be furnished about computing, network and integration interface infrastructure.

1.1.8 Submit details of methodology followed by the bidder and its sub-vendors in successfully implementing similar projects.

1.1.9 Schedule of Deviations if any from specification strictly following the prescribed format.

1.1.10 Commercial specification details as per attached sheet.

1.1.11 Proper authorization letter to sign the tender on behalf of bidder shall accompany the bid.

1.1.12 Compliance to the approved vendor list.

1.1.13 List of major relevant experiences of the Principal, Bidder, Sub-Vendors and the Product respectively.

1.1.14 Technical support facilities including qualified manpower, testing tools & instruments and integration facilities available within India.

1.1.15 Technical data sheet of all equipment including Sub-vendors systems, product brochure, white papers and case studies.

1.1.16 System Architecture drawings.

1.1.17 Detailed Bill of Material, covering all aspects of proposed System specifications and functionality required by Purchaser as per the RFP.

1.1.18 Product life cycle document of all equipment of Bidder’s own and of Sub-Vendors.

1.1.19 Quality Assurance Plan (QAP), Manufacturing Quality Plan (MQP), Field Quality Plan (FQP).

1.1.20 Testing facilities in India

1.1.21 Confirmation on lifetime, spares, manufacturing, onsite & Offsite technical support of the supplied equipment for the period of 10 years.

1.1.22 **Project Team Structure**

Furnish the detail of the team that would be deployed by bidder to execute the project. Please provide details of the team structure in the following format:

Name of Staff	Position Assigned	International or Domestic	Firm	Employment status with the firm (Full time/ Associate)	Education (Degree, Year, Institution)	Area of Expertise and no. of years of relevant experience	Task Assigned
A. Professional Staff							
B. Support Staff							

Table # 2: Proposed Project Team Structure

Similarly, bidder shall arrange the team details of the Sub-vendors, that would be deployed to execute the project

1.1.23 **Team details (CVs)**

Use the following format for key personnel who would be involved in the project. Please include details of team members proposed to implement the project, install or manage hardware, install and manage Substation DC System, please ensure that the CV covers all the required field and details.

1.	**Proposed Position**			
2.	**Name of Firm and Role**			
3.	**Name of Staff**			
4.	**Date of Birth**		**Nationality**	

5.	**Education**		
	Year	**Degree/Examination**	**Institute/Board**
6.	**Membership of Professional Associations**		
7.	**Other Training**		
8.	**Countries of Work Experience**		
9.	**Languages**		
	Language	**Speaking**	**Reading**	**Writing**
10.	**Employment Record**		
	From	**To**	**Employer**	**Positions Held**

11.	**Detailed Tasks Assigned**	**12.**	**Work Undertaken that best illustrates capability to handle the tasks assigned:**
13.	**Certification**		
	I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience. I understand that any willful misstatement described herein may lead to my disqualification or dismissal, if engaged.		
	Signature of authorized representative of the staff	Date:	
	Full name of authorized representative:		

Table # 3: Format for CV Submission

Similarly, Bidder to submit the key personnel details of the Sub-Vendors, who would be involved in the project. Please include details of team members proposed to implement the project, install or manage hardware, install and manage Substation DC System.

2.0 After Award of Contract

Documentation shall be provided by the bidder for all equipment and functions offered as part of this procurement including Sub-vendors equipment/systems and functions. All documentation shall be in English. The documentation shall cover all systems required by Purchaser, including all its hardware, software, and interfaces and shall cover functionality, testing, installation, system startup, operations, and maintenance.

2.1 General Requirement

a. The Bidder shall furnish the following drawings/documents during detailed engineering as per schedule ***(Refer Section-A, Item 9.0)*** from date of PO Placement Bidder to submit all datasheets, detailed GTP of the proposed BoM items during detailed engineering for the approval and finalization by Purchaser.

b. Circuit Diagram and design documentation. This drawing should show in detail of the following:

i. Inter-connection diagram of the components

ii. Component details

iii. Type of interconnecting cable

c. Panel GA, Scheme and Complete wiring diagram

d. Functional Design Specification document

e. Step by Step test procedures for Factory Acceptance Test (FAT) and Site Acceptance Test (SAT)

f. Interconnection Schedule (ICS) for DC System, detailed drawing indicating interconnections between various components.

g. Technical/operation manuals for all the equipment supplied including that of Third parties.

h. All Software Licenses (both own & third party), if applicable

i. Guaranteed technical parameters & Guaranteed availability and reliability

j. Calculation for power supply dimensioning

k. Bill of Material listing equipment designation, make, type ratings, etc. of all the equipment's supplied

l. Operator's Manual

m. Credentials created for all OEM systems for support to be provided as consolidated document stating clearly the SLA timelines agreed with each of the OEM.

n. SLA signed document for system support and restoration in case of breakdown to be clearly document and provided as submission document.

o. Final as built drawings of all Substation DC system as final documents in AutoCAD & PDF format

p. Other documents as may be required / applicable during detailed engineering

q. All drawings and data shall be annotated in English.

r. Bidder shall furnish Four (4) hardcopies and 3 soft copies on reliable media of all drawings, manuals (Administration, Operation & Maintenance, Configuration, Troubleshooting and Installation), Technical catalogues, Test Certificates and Acceptance Test Reports.

s. Two copies of the internal test report, FAT and SAT documents with test protocol formats shall be submitted for approval at least four (4) weeks before Factory Acceptance Test. Two copies of SAT protocol shall be submitted for approval at least four (4) weeks before Site Acceptance Test.

t. Bidder shall also furnish Original plus one copy of all System Software (OS, Application and tools) along with delivery. Bidder shall submit two copies of all the configuration, application, display, database backup of all equipment on reliable secondary media.

2.2 Definitions

For the purposes of this project, the following definitions shall be used:

a. **Documents or Documentation** – Textural and graphical information describing the offered equipment, systems, and other items peripheral for Substation DC System, whether embodied in hardcopy or electronic form such as common word processor files. Documents may also be referred to as manuals, guides, books, drawings, transmittals, and specifications. Documents are further divided into standard, OEM, and custom documents.

b. **Standard documents** – Documents produced by the Bidder and used prior to the award of this contract that are applicable to all users of the equipment and software, including Purchaser. It is expected that the Bidder will use a formal revision control scheme to maintain its standard documents. Documents not maintained under such a scheme shall be considered custom documents.

c. **OEM documents** – OEM (Original Equipment Manufacturer) documents are those standard documents produced by Vendor, Sub-vendors. Documents produced by Vendor, Sub-vendors for customized elements of the System shall be deemed custom documents.

d. **Custom documents** – All documents not categorized as standard or OEM documents including the Bidder's standard documents that are modified to meet Purchaser's specific requirements.

e. **Project Documents** – Project documents are those documents produced for the conduct of the project, but which do not directly describe the Sub-Station DC System. Examples of project documents include meeting minutes, action item lists, test plans and procedures, and transmittal and document lists.

2.3 Project Planning Documentation

2.3.1 Documentation Plan

Bidder to note that after the order acceptance, the project kick of meeting will be arranged by the Purchaser, in which MDL will also be finalized, Bidder shall furnish the schedule for submission of documents for the documents mentioned in the MDL and accordingly arrange submit the documents for Purchaser's Review and Approval.

It is expected that certain major documents, such as the detailed hardware and software design documentation, will consist of a series of submittals made over a period. The

documentation plan shall address this by including a detailed list of all individual documentation submittals for the project.

Documents shall be submitted in a sequence as per the MDL, that allows Purchaser to have all the information necessary for reviewing or approving a document at the time of its submittal. The documentation plan shall be subject to Purchaser approval.

2.3.2 **Project Progress Reports**

A project progress report shall be prepared by the Bidder and sent to Purchaser every two weeks through the start of the warranty period. The report shall be submitted to Purchaser's Project Manager no later than the 10th calendar day of each month. The report shall cover the project from the start of the contract through the last working day of the month.

The progress report shall include a general assessment of the progress on the project. This assessment shall reference the latest implementation schedule, which shall be included in the report. The schedule shall show the baseline and the current schedule, progress on individual tasks, and the forecasted completion dates for upcoming tasks and the entire project. Updated training and documentation plans shall be included.

The report shall include an explanation of existing and forecast schedule variances, the cause or source of the variance, alternatives considered, solutions adopted or recommended, and the outcome achieved or anticipated. In particular, the report shall note the needed delivery date of Purchaser furnished information. The Bidder shall be responsible for any schedule delays due to insufficient notification to Purchaser of the need for such information.

The report shall identify unresolved contract issues. This shall include a description of the item and the current due date, the consequences of any delay in resolution, and any recommendations pertinent to the decision process. The report shall also include the following items:

a. A list of action items, including the following information:

i. Action item number

ii. Date the item was opened

iii. References to the originating transmittal and any reference documents

iv. Action item status (Open, Closed)

v. Resolution due Date

vi. Responsible Organization or Person

vii. A description of the action required

viii. The date of action completion (when each item is closed)

ix. References to transmittals or other documents recording the resolution.

b. Correspondence logs, one for transmittals to Purchaser from the Bidder and one for transmittals to the Bidder from Purchaser. Each log shall have the following information for each transmittal:

i. The transmittal numbers

ii. The date of transmission (not the date written)

iii. The date received

iv. The subject of the transmittal

v. Identification of any action items addressed by the transmittal

vi. A list of any documents attached to the transmittal.

2.3.3 **Project Meetings, Agendas, and Minutes**

Project meetings shall be held to review project progress, to ensure correct interpretation of the contract, to review technical and commercial issues, and to maintain co-ordination between Purchaser and Bidder. Meetings shall be scheduled at appropriate times. Purchaser prefer to schedule meeting every month on average. The meetings shall be divided between Purchaser's and Bidder's offices. The Bidder's project manager shall prepare a meeting agenda in time for review by Purchaser before the meeting.

The Bidder shall prepare minutes of each meeting. Both Purchaser and the Bidder shall review and approve the minutes. The approved minutes shall be considered binding agreements, subject to concordance with the contract. Where the approved minutes conflict with the contract, either the minutes shall be revised or a change order to the contract shall be generated. Where the minutes of a meeting conflict with the approved minutes of a previous meeting, the conflict shall be documented in the later minutes and those approved minutes shall have precedence.

2.3.4 **Project Correspondence**

All requests and transfers of information between the parties shall be made in writing and shall be documented with letters of transmittal. All correspondence from each party shall be dated (with the date of transmittal, not the date of writing) and uniquely numbered. Except for the meeting minutes, each letter or other project correspondence shall be limited to a single topic to simplify correspondence management. Correspondence transmitted via mail shall be considered as binding if a printed copy of the correspondence is delivered within four weeks of the mail transmission.

Correspondence may be exchanged by electronic mail. Such correspondence shall not be considered a substitute for formal correspondence, however. Agreements established through e-mail transmittals must be recorded as formal correspondence before they become binding. A printed copy of e-mail attached to a transmittal cover sheet shall be considered a formal transmittal.

All project management documentation, such as, correspondence, memos, meeting minutes, and monthly progress reports, shall be maintained. A mutually agreeable file numbering scheme shall be developed and used to minimize file storage and retrieval efforts.

2.3.5 **Detailed Implementation Schedule**

The Bidder shall submit for Purchaser's approval a detailed implementation schedule. This shall describe all the project activities of both the Bidder and Purchaser. As a minimum, this schedule shall include the following:

a. Kickoff Meeting

b. Preparation and finalization of MDL document

c. Hardware procurement, integration, and testing

d. Delivery dates for Purchaser furnished data, interface equipment, and software

e. Preparation of test plans and procedures

f. Factory and Site tests

g. Variance correction and retest

h. System disassembly, delivery, and installation

i. Final system and user documentation

j. Training

k. Submittal dates, review cycles, and acceptance dates for the hardware, software, and interface requirements documents.

The training and documentation schedules may be maintained outside the implementation schedule. However, the implementation schedule shall include all the dependencies of tasks contingent on documentation and training tasks.

The Bidder shall use a commercially available project management application (for example, Microsoft Project) to maintain the project schedule. This project management application shall be used to track the progress of the project from start through completion. Schedule monitoring shall be based on a comparison of completed tasks versus scheduled tasks and estimation of the required effort to complete the remaining tasks. The schedule presented to Purchaser shall be that used by the Bidder to manage their internal resources.

2.4 Document Format

Documents shall be delivered in two phases:

a. Approval documents, submitted for Purchaser's review and approval

b. Final documents

Purchaser prefers that documents be delivered in both hard and soft form. Softcopy shall be delivered on magnetic media. Final documents shall be delivered on hardcopy, and on softcopy on Secondary Media. Any user shall be able to access on-line documentation on Engineering Laptop including functional design documents, user guides, maintenance manuals, on-line help, and operating procedures via a simple procedure involving a one-click operation.

Documents shall be supplied in a format that can be edited by Purchaser. Handwritten texts are not acceptable. Purchaser's standard word processing software is Microsoft Office. The Bidder is encouraged to use this software for documents. If the Bidder uses other word processing or document production software, four copies of the software, suitable for installation on a personal computer using the Windows10 operating system or newer versions, shall be provided.

Drawings and diagrams may be supplied embedded in the document files or may be supplied as separate files. Purchaser's standard drawing software is AutoCAD.

Documents delivered as hardcopy shall be printed on both sides of A4 size paper and bound in three-ring binders. Divider pages with appropriately labeled tabs shall separate chapters. The spine of each volume shall be labeled with the document title and volume number so it may be easily identified when shelved.

Documents delivered on softcopy media shall be formatted for printing on A4 size paper.

Each document shall include a title or information page showing the document number, title, and revision record. The document number shall be a unique number assigned in accordance with the Bidder's standard practice. The title page shall include a space into which Purchaser may enter a document number assigned from Purchaser's document management system. The revision record shall describe each new version of the document since its original production. The revision record shall include:

i. The date of the change

ii. A brief description of the change

iii. An indication that the change has been reviewed and approved in accordance with the Bidder's quality assurance procedure

iv. The version or release of the hardware or software to which the document applies.

Each document shall include a table of contents. If a document is divided into several physical volumes, each volume shall contain the complete table of contents of the whole document. Furthermore, each document shall have a cross-reference table, listing all topics of significance covered by the document, and giving the page or section references of all pages or sections with discussions of the topic.

Documents that describe generic or typical Substation DC elements will not be acceptable to Purchaser unless the specific material applicable to this project can be readily identified and materiel not applicable to this project can be similarly identified. Custom documents shall not contain any material that is not pertinent to this project.

Where the phrase "on-line documentation" is used in these Specifications, it shall be interpreted to mean the ability to view the document from any workstation. The Bidder shall provide all software necessary to provide this capability. For non-OEM documentation (documentation produced by the Bidder), the Bidder shall also provide the capability to edit and annotate the document.

2.5 Document Review and Approval

All standard and OEM documents provided pursuant to this contract shall be subject to review by Purchaser. Custom documents provided pursuant to this contract shall be subject to approval by Purchaser.

2.5.1 Document Review

Purchaser's review of documents shall be limited to determining that:

a. The documents have been produced in accordance with the documentation standards of the Bidder or Sub-vendors

b. All hardware and software are in full conformance with the contract

c. The documents clearly and accurately describe the features and options of the hardware and software that pertain to the Substation DC System

d. The documents are written in English, and hard copies are printed legibly, and well bound.

Purchaser will review documents as per the schedule mentioned in the MDL. If Purchaser does not transmit comments on the documents within the review period, the Bidder shall discuss with the Purchaser.

If Purchaser transmits comments on any documents, the Bidder shall respond to the comments within seven working days or as per the MDL after receipt of the comments. If the comments address OEM documents, the Bidder shall act as an advocate of Purchaser to initiate and facilitate resolution of the comments with the Sub-vendor.

2.5.2 Document Approval

All custom documents shall be subject to a formal approval process. The review for approval performed by Purchaser will be similar to that for document review process but will more closely examine the functionality and design aspects of the hardware or software. Clarity and completeness of the presentation of the material within the documents will be a key element of the review for approval.

The approval process shall proceed as follows:

a. The Bidder shall transmit documents subject to the approval process to Purchaser as per MDL. This MDL time may be adjusted by mutual agreement to accommodate the other activities of Purchaser and the Bidder. Requests by either party to change the time shall be made within two working days of receipt of the documents by Purchaser.

b. Purchaser shall return comments to the Bidder within the agreed time. The transmittal cover for the comments shall clearly indicate that the document is either:

Approved – If approved, the Bidder may proceed with the work covered by the document. No further approval action is required.

Approved with Comments – If approved with comments, the Bidder may proceed with the work covered by the document and the comments.

Not Approved – If not approved, the Bidder may proceed with the work covered by the document and the comments only at their risk. No schedule or cost relief will be granted for any work undertaken prior to approval of the appropriate documents.

c. If desired by any party, the comments may be discussed to clarify Purchaser's intent.

d. The Bidder shall then revise and resubmit the documents within five working days after receipt of the comments from Purchaser. This time may be adjusted by mutual agreement to accommodate the other activities of Purchaser and the Bidder. Requests by either party to change the time shall be made within two working days of receipt of the comments by the Bidder.

All changes made to documents to reflect approval comments shall be clearly highlighted and the revision record shall be updated to reflect the changes. Purchaser prefers the use of the change-tracking feature of the word processor used to produce the documents.

e. The review and comment process shall be repeated until the document is accepted. After the document is accepted, Bidder shall deliver the required number of final copies free of highlighting due to tracking of changes.

All changes made to documents to reflect approval comments shall be clearly highlighted and the revision record shall be updated to reflect the changes. Purchaser prefers the use of the change-tracking feature of the word processor used to produce the documents.

Scope of Reviews and Approvals

The acceptance or approval of any documents by Purchaser shall not relieve the Bidder of the responsibility to meet all the requirements of the contract or of the responsibility for the correction of the documents. The Bidder shall have no claim for additional costs or extension of time on account of delays due to revisions of the documents that may be necessary for ensuring compliance with the contract.

All deliverable documentation shall be revised by the Bidder to reflect the delivered System. Any modifications to the offered/installed system resulting from the factory and site acceptance tests shall be incorporated in this documentation. All previously submitted documents that have been changed because of engineering changes, contract changes, or errors or omissions shall be resubmitted for review and approval.

2.6 Deliverable Documentation

Two soft copy and three hard copies shall be provided for review and approval. Two soft copy and five hard copies shall be provided for all the final documentation for each site.

Document	Delivery Date
Basic hardware documents i. List of deliverables, interconnection lists ii. Site installation drawings and procedures	As per MDL
Equipment manuals	With each hardware delivery
Hardware maintenance manual	With each hardware delivery
Software list of deliverables, if applicable	As per MDL
Interface Requirements Document, if applicable	With the software functional description
Detailed design document	As per the project schedule
System maintenance manual	With the System delivery

2.7 Document Standards

The Bidder shall provide a document defining the standards used to create and maintain all documentation supplied by the Bidder. The standards shall define:

a. The word processing or document production software used to create the documents

b. Templates for each document type

c. Definitions of the contents for each document type

d. Drawing standards to be followed

e. The approval process to be followed for document releases.

2.8 Hardware Documentation

The following documentation shall be provided for all hardware provided pursuant to this contract:

a. List of deliverable hardware

b. Equipment configuration diagram

c. DC System SLD/Circuit Diagram

d. Interconnection list

e. Site installation drawings and procedures.

The other hardware documentation to be supplied shall be commensurate with the hardware maintenance philosophy to be employed by Purchaser.

Equipment manuals shall be provided for all hardware to be maintained by the Bidder or a third-party maintenance Bidder. Equipment manuals and hardware maintenance manuals shall be provided for all hardware to be maintained by Purchaser.

2.8.1 Site Installation Drawings and Procedures

The site drawings shall depict the physical arrangement of the components. References to the appropriate equipment manuals are acceptable. The drawings and procedures shall include:

a. Equipment physical drawings showing dimensions, cabinet internal arrangements, and the size and weight of each enclosure

b. Unpacking, moving, handling, and other installation details

c. The location of external connections including types and sizes of connectors

d. Input power and grounding requirements

e. Environmental requirements

2.8.2 Equipment Manuals

Equipment manuals shall contain the following:

a. A description of the function of the equipment

b. Installation, setup, and operating instructions

c. A block diagram showing the logical and physical interconnections among the major components

d. Expansion and upgrade capabilities and instructions

e. Preventative maintenance instructions

f. Detailed functional, logical, electrical, and mechanical characteristics of all interfaces to the device, including protocol descriptions

g. Troubleshooting and repair guides including a description and instructions for the diagnostics furnished.

2.8.3 **Hardware Maintenance Manuals**

The hardware maintenance manual shall describe the preventive maintenance and restorative procedures required to maintain the equipment in good operating condition. The information in the manuals shall include:

a. Operating details – This information shall include a detailed description of how the equipment operates and a block diagram illustrating each major assembly in the equipment. Descriptions of external data transfers with other equipment, including data patterns, security check-codes, and transfer sequences shall be included. The operational sequence of major assemblies within the equipment shall be described and illustrated by functional block diagrams and timing diagrams. Detailed logic diagrams shall also be provided as necessary for troubleshooting analysis and field repair actions.

b. Preventive maintenance instructions – These instructions shall include all applicable visual examinations, hardware testing and diagnostic routines, and the adjustments necessary for periodic preventive maintenance of the equipment. Instructions on how to load and use any test and diagnostic program and any special or standard test equipment shall be an integral part of these procedures.

c. Corrective maintenance instructions – These instructions shall include procedures for locating malfunctions down to the field-replaceable module level. These guides shall include adequate details for quickly and efficiently locating the source of an equipment malfunction. The instructions shall also include explanations for the adjustment or replacement of all items, including printed circuit cards. Schematic diagrams of electrical, mechanical, and electronic circuits, parts-location illustrations, photographs, cable routing diagrams, and sectional views giving details of mechanical assemblies shall be provided as necessary to

replace faulty equipment. For mechanical items requiring field repair, information on tolerances, clearances, wear limits, and maximum bolt-down torque shall be supplied. Information on the loading and use of special off-line diagnostic programs, tools, and test equipment, as well as any cautions or warnings that must be observed to protect personnel and equipment shall be included.

d. Parts information – This information shall include the identification of each replaceable or field- repairable module. All other parts shall also be identified. The identification shall be of a level of detail enough for procuring any repairable or replaceable part. Cross-references between the Bidder's part numbers and the manufacturer's part numbers shall be provided.

2.8.4 Bidder shall submit equipment warranty details of all the supplied system/equipment with detailed inventory list with make, model, Serial number, Software versions.

2.9 Software Documentation

The following documents shall be provided for all software, if applicable:

a. List of Deliverable Software

b. Software development standards

c. Software functional description

2.9.1 **System Software Maintenance Manual**

The System Maintenance Manual shall describe all user procedures necessary to build and maintain the Sub-station DC System. It shall provide information on optimizing system performance.

It shall include details on Configuration upgrades, firmware and patch upgrades

The System Maintenance Manual shall provide detailed information on troubleshooting all processors of the Substation DC systems. It shall describe the use of error logs, the meaning of all program-generated error or informational messages, and the recommended response to these messages. It shall explain what the user should do to save information after a processor failure and shall describe the procedures to gather this information to allow the user to communicate in an informed manner with maintenance personnel. It shall include a description of the procedures to restore normal operation after a failure of the offered systems.

2.10 Operating Manual

The Bidder shall submit, for review and approval, operating manuals for all Substation DC functions. The operating instructions associated with all features shall be incorporated into these manuals. Context sensitivity shall be used to go directly to the appropriate place in the manual.

The manuals shall be organized for quick access to each detailed description of the user procedures that are used to interact with the Substation DC functions. The manuals shall present in a clear and concise manner all information that a user needs to know to understand and operate satisfactorily. The manuals shall make abundant use of screen snapshots to illustrate the various procedures.

2.11 Acceptance Test Procedures

Acceptance test procedures (FAT & SAT) designed to test the specified requirements shall be provided. The procedures will comprise step-by-step instructions to verify that:

a. The system hardware and software are fully present and fully integrated, and its documentation is complete.

b. All the functional and performance requirements of the contract are met.

The test procedures shall be organized in the order that they are to be performed. Tests that require collection of data under controlled conditions shall be carefully planned with data collection procedures scheduled, as needed, before the tests themselves.

The test procedure shall be prepared in the format of step-by-step guides. Test descriptions, initial conditions, functions to be tested, expected responses, and recording areas are contained in the acceptance test procedures. The steps to achieve these functions may be provided as references to the user manuals or maintenance manuals. An attempt shall be made to cover all normal and abnormal circumstances in the procedures. The goal is to be able to rigorously test the system by strictly following carefully pre-planned procedures with minimum reliance on unstructured testing.

End of Section-D

Document Title: DC System for 33/11 kV Primary Substations

Document No: A&T/2021/SPEC-03/PSS DC System

SECTION – E

ANNEXURES

TP CENTRAL ODISHA DISTRIBUTION LIMITED
(A Tata Power & Odisha Govt. Joint Venture)
2nd Floor, IDCO Tower, Janpath, Bhubaneswar, Odisha 751022

Revision	Date	Description	Approvals		
			Prepared By	Checked By	Approved By
R0	24th Dec 2021	Released for Procurement	TKB/GSB	AKA	RKR

Section – E

Annexures

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The schematics, layouts, drawings in this section are indicative, bidder shall submit their best architecture, layout, drawings proposed as per specifications.

Annexure – 1: Sub-Station DC System Commissioning Plan

Phase # 1 (FY'21-22)

Sl. No.	Name of 33/11 kV Substation	Substation Type	Circle	Division Name		Plan	
1	Konark	Semi Urban	BBSR-I	NED	Nimapada	FY'21-22	Phase # 1
2	Pipili	Semi Urban	BBSR-I	NED	Nimapada	FY'21-22	Phase # 1
3	Nimapada	Semi Urban	BBSR-I	NED	Nimapada	FY'21-22	Phase # 1
4	ESIC	Urban	BBSR-I	NED	Khordha	FY'21-22	Phase # 1
5	Trisulia	Urban	BBSR-I	BCDD2	BBSR-I	FY'21-22	Phase # 1
6	10-Pole (Khorda Town)	Urban	BBSR-II	KHD	Khordha	FY'21-22	Phase # 1
7	Oil Mill, Khordha I.E.	Industrial	BBSR-II	KHD	Khordha	FY'21-22	Phase # 1
8	Janala	Semi Urban	BBSR-II	KHD	Khordha	FY'21-22	Phase # 1
9	Daspalla	Semi Urban	BBSR-II	NYD	Nayagarah	FY'21-22	Phase # 1
10	Nayagarh	Urban	BBSR-II	NYD	Nayagarah	FY'21-22	Phase # 1
11	Balugaon	Semi Urban	BBSR-II	BED	Balugaon	FY'21-22	Phase # 1
12	INS, Chillika	Industrial	BBSR-II	BED	Balugaon	FY'21-22	Phase # 1
13	Attharanala	Urban	BBSR-II	PED	Puri	FY'21-22	Phase # 1
14	Athagarh	Semi Urban	Cuttack	AED	Atthagarh	FY'21-22	Phase # 1
15	Choudwar	Semi Urban	Cuttack	CED	Cuttack	FY'21-22	Phase # 1
16	Chhatisha/Choudwar I.E	Industrial	Cuttack	CED	Cuttack	FY'21-22	Phase # 1
17	Tangi	Industrial	Cuttack	CED	Cuttack	FY'21-22	Phase # 1
18	Salipur	Semi Urban	Cuttack	SED	Salipur	FY'21-22	Phase # 1
19	Dakhinkali	Urban	Dhenkanal	DED	Dhenkanal	FY'21-22	Phase # 1
20	Industrial Estate	Industrial	Dhenkanal	AED	Angul	FY'21-22	Phase # 1
21	New RCMS	Urban	Dhenkanal	AED	Angul	FY'21-22	Phase # 1
22	Hemsarpada	Urban	Dhenkanal	AED	Angul	FY'21-22	Phase # 1

Phase # 2 (FY'22-23)

Sl. No.	Name of 33/11 kV Substation	Substation Type	Circle	Division Name		Plan	Plan
1	Kakatpur	Rural	BBSR-I	NED	Nimapada	FY'22-23	Phase # 2
2	Astaranga	Rural	BBSR-I	NED	Nimapada	FY'22-23	Phase # 2
3	Chhaitana	Rural	BBSR-I	NED	Nimapada	FY'22-23	Phase # 2
4	Balakati	Rural	BBSR-I	NED	Nimapada	FY'22-23	Phase # 2
5	Balipatna	Rural	BBSR-I	NED	Nimapada	FY'22-23	Phase # 2
6	Bayakuda/GOP	Rural	BBSR-I	NED	Nimapada	FY'22-23	Phase # 2
7	Gurujanga	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
8	Harirajpur	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
9	Tirumala	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
10	Malipada	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
11	Naranagada	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
12	Jankia	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
13	Tulasipur	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
14	Chakapada	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
15	Sunadeimundia	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
16	Jatamundia	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
17	Kalapathar	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
18	Baghamari	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
19	Parichhala	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
20	Rajsunakhela	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
21	Begunia	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
22	Dadhimachagadia	Rural	BBSR-II	KHD	Khurda	FY'22-23	Phase # 2
23	Jatni	Urban	BBSR-II	KHD	Khordha	FY'22-23	Phase # 2
24	Khandapada	Rural	BBSR-II	NYD	Nayagarah	FY'22-23	Phase # 2
25	Fategarh	Rural	BBSR-II	NYD	Nayagarah	FY'22-23	Phase # 2
26	Kantilo	Rural	BBSR-II	NYD	Nayagarah	FY'22-23	Phase # 2
27	Gania	Rural	BBSR-II	NYD	Nayagarah	FY'22-23	Phase # 2
28	Nuagaon	Rural	BBSR-II	NYD	Nayagarah	FY'22-23	Phase # 2
29	Mahipur	Rural	BBSR-II	NYD	Nayagarah	FY'22-23	Phase # 2
30	Sarankula	Rural	BBSR-II	NYD	Nayagarah	FY'22-23	Phase # 2
31	Odogaon	Rural	BBSR-II	NYD	Nayagarah	FY'22-23	Phase # 2
32	Itamati	Rural	BBSR-II	NYD	Nayagarah	FY'22-23	Phase # 2
33	Bologarh	Rural	BBSR-II	NYD	Nayagarah	FY'22-23	Phase # 2
34	Sakhigopal	Rural	BBSR-II	PED	Puri	FY'22-23	Phase # 2

Sl. No.	Name of 33/11 kV Substation	Substation Type	Circle	Division Name		Plan	Plan
35	Chandanpur	Rural	BBSR-II	PED	Puri	FY'22-23	Phase # 2
36	Brahmagiri	Rural	BBSR-II	PED	Puri	FY'22-23	Phase # 2
37	Sunamuhi	Rural	BBSR-II	PED	Puri	FY'22-23	Phase # 2
38	Delanga	Rural	BBSR-II	PED	Puri	FY'22-23	Phase # 2
39	Kanasa	Rural	BBSR-II	PED	Puri	FY'22-23	Phase # 2
40	KUMARESWAR	Rural	BBSR-II	PED	Puri	FY'22-23	Phase # 2
41	Khajuria	Rural	BBSR-II	PED	Puri	FY'22-23	Phase # 2
42	Basudeipur	Rural	BBSR-II	PED	Puri	FY'22-23	Phase # 2
43	Khandisi	Rural	BBSR-II	PED	Puri	FY'22-23	Phase # 2
44	Tangi	Rural	BBSR-II	BED	Balugaon	FY'22-23	Phase # 2
45	Nachuni	Rural	BBSR-II	BED	Balugaon	FY'22-23	Phase # 2
46	Ranapur	Rural	BBSR-II	BED	Balugaon	FY'22-23	Phase # 2
47	Ankulapadar	Rural	BBSR-II	BED	Balugaon	FY'22-23	Phase # 2
48	Kuhudi	Rural	BBSR-II	BED	Balugaon	FY'22-23	Phase # 2
49	Chandpur	Rural	BBSR-II	BED	Balugaon	FY'22-23	Phase # 2
50	Bhusandpur	Rural	BBSR-II	BED	Balugaon	FY'22-23	Phase # 2
51	Gondia	Semi Urban	Dhenkanal	DED	Dhenkanal	FY'22-23	Phase # 2
52	Hindol Road	Semi Urban	Dhenkanal	DED	Dhenkanal	FY'22-23	Phase # 2
53	Kamakhyanagar	Semi Urban	Dhenkanal	DED	Dhenkanal	FY'22-23	Phase # 2
54	Bhuban	Semi Urban	Dhenkanal	DED	Dhenkanal	FY'22-23	Phase # 2
55	Athamallik	Semi Urban	Dhenkanal	AED	Angul	FY'22-23	Phase # 2
56	Banarpal	Semi Urban	Dhenkanal	TED	Chainpal	FY'22-23	Phase # 2
57	College Str	Urban	Dhenkanal	DED	Dhenkanal	FY'22-23	Phase # 2
58	Talcher-II	Urban	Dhenkanal	TED	Chainpal	FY'22-23	Phase # 2
59	Chainpal	Urban	Dhenkanal	TED	Chainpal	FY'22-23	Phase # 2
60	Talcher Town	Urban	Dhenkanal	TED	Chainpal	FY'22-23	Phase # 2
61	Pallahara	Semi Urban	Dhenkanal	TED	Chainpal	FY'22-23	Phase # 2
62	Jagatsinghpur	Urban	Paradeep	JED	Jagatsinghpur	FY'22-23	Phase # 2
63	Marshaghai	Semi Urban	Paradeep	KED-II	Marshaghai	FY'22-23	Phase # 2
64	Paradeep	Urban	Paradeep	PDP	Paradeep	FY'22-23	Phase # 2
65	Kendrapara	Urban	Paradeep	KED-I	Kendrapara	FY'22-23	Phase # 2
66	Pattamundai	Urban	Paradeep	KED-I	Kendrapara	FY'22-23	Phase # 2
67	Duhuria	Urban	Paradeep	KED-I	Kendrapara	FY'22-23	Phase # 2

Phase # 3 (FY'23-24)

This Phase will be taken up after completion of Phase # 1 & Phase # 2

Sl. No.	Name of 33/11 kV Substation	Substation Type	Circle	Division Name		Plan	Plan
1	Darpanarayanpur	Rural	BBSR-II	BED	Balugaon	FY'23-24	Phase # 3
2	Kisan Nagar	Rural	Cuttack	CDD-II	Cuttack	FY'23-24	Phase # 3
3	Kandarpur	Rural	Cuttack	CDD-II	Cuttack	FY'23-24	Phase # 3
4	Narangabasta	Rural	Cuttack	AED	Atthagarh	FY'23-24	Phase # 3
5	Khuntuni	Rural	Cuttack	AED	Atthagarh	FY'23-24	Phase # 3
6	Tigiria	Rural	Cuttack	AED	Atthagarh	FY'23-24	Phase # 3
7	Nuapatna	Rural	Cuttack	AED	Atthagarh	FY'23-24	Phase # 3
8	Badamba	Rural	Cuttack	AED	Atthagarh	FY'23-24	Phase # 3
9	Kanpur	Rural	Cuttack	AED	Atthagarh	FY'23-24	Phase # 3
10	Narsinghpur	Rural	Cuttack	AED	Atthagarh	FY'23-24	Phase # 3
11	Gurudijhatia	Rural	Cuttack	AED	Atthagarh	FY'23-24	Phase # 3
12	Khuntakata	Rural	Cuttack	AED	Atthagarh	FY'23-24	Phase # 3
13	Sarpeswar	Rural	Cuttack	AED	Atthagarh	FY'23-24	Phase # 3
14	Niali	Rural	Cuttack	CED	Cuttack	FY'23-24	Phase # 3
15	Adaspur	Rural	Cuttack	CED	Cuttack	FY'23-24	Phase # 3
16	Kasarada	Rural	Cuttack	CED	Cuttack	FY'23-24	Phase # 3
17	Damodarpur	Rural	Cuttack	CED	Cuttack	FY'23-24	Phase # 3
18	Badachana	Rural	Cuttack	CED	Cuttack	FY'23-24	Phase # 3
19	Chhatia	Rural	Cuttack	CED	Cuttack	FY'23-24	Phase # 3
20	Balichandrapur	Rural	Cuttack	CED	Cuttack	FY'23-24	Phase # 3
21	Bahugram-I	Rural	Cuttack	SED	Salipur	FY'23-24	Phase # 3
22	Bahugram-II	Rural	Cuttack	SED	Salipur	FY'23-24	Phase # 3
23	Nischint.Koili	Rural	Cuttack	SED	Salipur	FY'23-24	Phase # 3
24	Paldhuapada	Rural	Cuttack	SED	Salipur	FY'23-24	Phase # 3
25	Orikanta	Rural	Cuttack	SED	Salipur	FY'23-24	Phase # 3
26	Mahanga	Rural	Cuttack	SED	Salipur	FY'23-24	Phase # 3
27	Kothpada	Rural	Cuttack	SED	Salipur	FY'23-24	Phase # 3
28	Bhapur	Rural	Dhenkanal	DED	Dhenkanal	FY'23-24	Phase # 3
29	Gundichapada	Rural	Dhenkanal	DED	Dhenkanal	FY'23-24	Phase # 3
30	Khajuriakata	Rural	Dhenkanal	DED	Dhenkanal	FY'23-24	Phase # 3
31	Hindol	Rural	Dhenkanal	DED	Dhenkanal	FY'23-24	Phase # 3
32	Badasuanlo	Rural	Dhenkanal	DED	Dhenkanal	FY'23-24	Phase # 3

Sl. No.	Name of 33/11 kV Substation	Substation Type	Circle	Division Name		Plan	Plan
33	Mathakargola	Rural	Dhenkanal	DED	Dhenkanal	FY'23-24	Phase # 3
34	Dahanbil	Rural	Dhenkanal	DED	Dhenkanal	FY'23-24	Phase # 3
35	Goda	Rural	Dhenkanal	DED	Dhenkanal	FY'23-24	Phase # 3
36	Joranda	Rural	Dhenkanal	DED	Dhenkanal	FY'23-24	Phase # 3
37	Kankadahada	Rural	Dhenkanal	DED	Dhenkanal	FY'23-24	Phase # 3
38	Kaliapani	Rural	Dhenkanal	DED	Dhenkanal	FY'23-24	Phase # 3
39	Nihalprasad	Rural	Dhenkanal	DED	Dhenkanal	FY'23-24	Phase # 3
40	Bantala	Rural	Dhenkanal	AED	Angul	FY'23-24	Phase # 3
41	Jarapada	Rural	Dhenkanal	AED	Angul	FY'23-24	Phase # 3
42	Chhendipada	Rural	Dhenkanal	AED	Angul	FY'23-24	Phase # 3
43	Boinda	Rural	Dhenkanal	AED	Angul	FY'23-24	Phase # 3
44	Anandpur	Rural	Dhenkanal	AED	Angul	FY'23-24	Phase # 3
45	Madhapur	Rural	Dhenkanal	AED	Angul	FY'23-24	Phase # 3
46	Bamur	Rural	Dhenkanal	AED	Angul	FY'23-24	Phase # 3
47	Baruan	Rural	Dhenkanal	TED	Chainpal	FY'23-24	Phase # 3
48	Saranga	Rural	Dhenkanal	TED	Chainpal	FY'23-24	Phase # 3
49	Parjanga	Rural	Dhenkanal	TED	Chainpal	FY'23-24	Phase # 3
50	South Balanda	Rural	Dhenkanal	TED	Chainpal	FY'23-24	Phase # 3
51	Samal	Rural	Dhenkanal	TED	Chainpal	FY'23-24	Phase # 3
52	Kaniha	Rural	Dhenkanal	TED	Chainpal	FY'23-24	Phase # 3
53	Parabil	Rural	Dhenkanal	TED	Chainpal	FY'23-24	Phase # 3
54	Khamar	Rural	Dhenkanal	TED	Chainpal	FY'23-24	Phase # 3
55	Rengali	Rural	Dhenkanal	TED	Chainpal	FY'23-24	Phase # 3
56	Jogadhari	Rural	Paradeep	JED	Jagatsinghpur	FY'23-24	Phase # 3
57	Biridi	Rural	Paradeep	JED	Jagatsinghpur	FY'23-24	Phase # 3
58	Raghunathpur	Rural	Paradeep	JED	Jagatsinghpur	FY'23-24	Phase # 3
59	Balikuda	Rural	Paradeep	JED	Jagatsinghpur	FY'23-24	Phase # 3
60	Sova	Rural	Paradeep	JED	Jagatsinghpur	FY'23-24	Phase # 3
61	Nabapatna	Rural	Paradeep	JED	Jagatsinghpur	FY'23-24	Phase # 3
62	Naugaon	Rural	Paradeep	JED	Jagatsinghpur	FY'23-24	Phase # 3
63	22Mouza	Rural	Paradeep	JED	Jagatsinghpur	FY'23-24	Phase # 3
64	Nuapada	Rural	Paradeep	JED	Jagatsinghpur	FY'23-24	Phase # 3
65	Sasanpada	Rural	Paradeep	JED	Jagatsinghpur	FY'23-24	Phase # 3
66	Garadpur	Rural	Paradeep	KED-II	Marshaghai	FY'23-24	Phase # 3
67	Korua	Rural	Paradeep	KED-II	Marshaghai	FY'23-24	Phase # 3
68	Mahakalapara	Rural	Paradeep	KED-II	Marshaghai	FY'23-24	Phase # 3

Sl. No.	Name of 33/11 kV Substation	Substation Type	Circle	Division Name		Plan	Plan
69	Luna	Rural	Paradeep	KED-II	Marshaghai	FY'23-24	Phase # 3
70	Chhapali	Rural	Paradeep	KED-II	Marshaghai	FY'23-24	Phase # 3
71	Badhi	Rural	Paradeep	KED-II	Marshaghai	FY'23-24	Phase # 3
72	Kujanga	Rural	Paradeep	PDP	Paradeep	FY'23-24	Phase # 3
73	Tirtol	Rural	Paradeep	PDP	Paradeep	FY'23-24	Phase # 3
74	Ersama	Rural	Paradeep	PDP	Paradeep	FY'23-24	Phase # 3
75	Rahama	Rural	Paradeep	PDP	Paradeep	FY'23-24	Phase # 3
76	Paruna	Rural	Paradeep	PDP	Paradeep	FY'23-24	Phase # 3
77	Danpur	Rural	Paradeep	KED-I	Kendrapara	FY'23-24	Phase # 3
78	Indupur	Rural	Paradeep	KED-I	Kendrapara	FY'23-24	Phase # 3
79	Patrapur	Rural	Paradeep	KED-I	Kendrapara	FY'23-24	Phase # 3
80	Gogua	Rural	Paradeep	KED-I	Kendrapara	FY'23-24	Phase # 3
81	Dandisahi	Rural	Paradeep	KED-I	Kendrapara	FY'23-24	Phase # 3
82	Adhajori	Rural	Paradeep	KED-I	Kendrapara	FY'23-24	Phase # 3
83	Rajnagar (2)	Rural	Paradeep	KED-I	Kendrapara	FY'23-24	Phase # 3
84	Rajkanika	Rural	Paradeep	KED-I	Kendrapara	FY'23-24	Phase # 3
85	Aul	Rural	Paradeep	KED-I	Kendrapara	FY'23-24	Phase # 3
86	Balarampur	Rural	Paradeep	KED-I	Kendrapara	FY'23-24	Phase # 3
87	Sahupada	Rural	Paradeep	KED-I	Kendrapara	FY'23-24	Phase # 3
88	Chhata	Rural	Paradeep	KED-I	Kendrapara	FY'23-24	Phase # 3
89	Chhagadia	Rural	Paradeep	KED-I	Kendrapara	FY'23-24	Phase # 3
90	Kandira	Rural	Paradeep	KED-I	Kendrapara	FY'23-24	Phase # 3

Bidder to note that the above list (Phase#1, Phase#2, Phase#3) is tentative, preference of substation may change during detailed engineering as per the Operational Requirement.

Annexure – 2: Indicative Signal List

Sl. No.	Item Description	Signal Type
1	Battery Voltage	Analogue
2	Battery Current	Analogue
3	Charger Voltage	Analogue
4	Charger Current	Analogue
5	Load Voltage	Analogue
6	Load Current	Analogue
7	Battery Under Voltage	SPI
8	Battery Over Voltage	SPI
9	Battery Under Voltage Warning	SPI
10	Charger Under Voltage	SPI
11	Charger Over Voltage	SPI
12	Load Under Voltage	SPI
13	Load Over Voltage	SPI
14	Earth Fault detected	SPI
15	Battery (Over Current Fault)	SPI
16	Charger (Over Current Fault)	SPI
17	Load (Over Current Fault)	SPI
18	Input MCCB Trip	SPI
19	DCDB Incomer MCCB Trip	SPI
20	Rectifier Module fail	SPI

Annexure – 3: Preferred/Approved Make of Equipment/System

Sl. No.	Item Description	Preferred Make / Model
1	DC System (24 V DC)	Masstech/Delta/Chloride/STATCON/Vertive/Amarraja
2	Communicable Cable (Shielded Twisted Pair)	Belden/LAPP/SATYAM /Finolex / Polycab / Mescab /Digi Link/ Equivalent
3	Power Cable	CCI / FORT GLOSTER / FINOLEX / HAVELLS / Indian aluminum Cables / Universal Cables / Incab / Asian Cable / KEI / Polycab / Ruchika/equivalent

Annexure – 4: Indicative Bill of Material for Proposed DC System for 33/11KV Substations

Information to Bidder:

Sl. No.	Information to Bidder
1	The overall system warranty is for 05 years. Bidders needs to quote the prices for the materials and services with 5 year warranty.
2	This will be a Rate Contract for 02 years. Prices will remain fixed till the contract period. No escalation is permitted.
3	Mandatory spares will be supplied by the bidder at the time of SITC. Since the compete system is covered under 05 year warranty support period, bidder will repair/supply all the spares at free of cost to TPCODL during this period. Mandatory spares procured by TPCODL are for reserve and emergency situation. In case the bidder utilises the spares procured by the TPCODL due to some reason/s, same shall be replenished without any cost to TPCODL.
4	Bill of Quantity mentioned in the tables are indicative, this may vary to meet the functional or site requirement. It is the responsibility of the Bidder to include all Hardware, Software and Services as per functional requirement specified in the RFP and as per the phases mentioned.
5	Bidder to refer preferred make and model of the equipment to be considered for this project. All bidder's own and bought out items shall be subject to Purchaser's prior approval.
6	The bidder shall propose and design the solution considering all the functional requirement stated in the RFP and shall submit the complete solution for phase wise implementation.
7	All DC Systems Hardware, Application, configuration tools shall of latest technology.
8	All cabling (Communication, Power Supply, Field, Interfaces) is in Bidder's scope. This includes supply, laying, termination and connection to equipment (Bidder's own & Purchaser's equipment).
9	Bidder to ensure the deployment of the resources and service requirement during Standard Warranty Support for all the supplied equipment (Bidder's Own and bought out items). SLA will be prepared with the successful bidder to achieve the 24X7 availability and reliability of the installed

	system
10	All annual maintenance charges of supplied DC System are inclusive in the Warranty of Bidder's Owned items, Sub-vendor items, controller software upgrades etc.
11	All the materials to be delivered should be F.O.R at TPCODL sites.
12	The bidders are advised to quote prices strictly in the format attached.
13	The bidder must fill each and every column of the format attached. Mentioning “extra/inclusive” in any of the column may lead to rejection of the price bid.
14	No cutting/ overwriting in the prices is permissible.
15	The unit price to be indicated in col. No. 8 should be exclusive of taxes & duties which are to be indicated in separate columns meant for the purpose.
16	The bids will be evaluated technically and commercially on the overall scope. TPCODL reserves right to split the order quantity wise among more than one Bidder. Hence, all bidders are advised to quote their most competitive rates accordingly.
17	In case of increase in quantity for any item, the unit rate mentioned above shall be considered for the same.
18	HSN/SAC codes for respective line item must be mandatorily provided wherever applicable.

Breakup of Total Lump Sum Contract Price for DC System

Item	SITC (INR)	Mandatory Spares (INR)	Training (INR)	Total (INR)
	All Inclusive	All Inclusive	All Inclusive	All Inclusive
Phase # 1	0	0	0	0
Phase # 2	0	0	0	0
Grand Total (Phase 1+ Phase 2) (INR)	0			

Note:

1. Bidder to note that the prices quoted for optional item will be used for any Addition/Deletion of module as per the site Requirement.
2. The Modules shall be considered with all required software, Cables, Connectors etc.
3. Bidders are requested to quote their most-competitive prices .

Price Schedule & BOM of proposed DC System for 33/11kV Substation (Phase # 1)

Sl. No.	Item	Description	UOM	Qty/ Substations	Total Required Quantity (A)	HSN/SAC Code	Unit Rate (B)	GST (%)	GST (INR) (C)
A	**24 V DC System Battery, Battery Charger, DCDB and Microprocessor Based Controller**								
A1	**24 V DC SYSTEM**	24V, 70 Amp Float Cum Boost Charger with Microprocessor based Controller (N+1) Controller OS, Application Software and configuration Tool licenses **Protocols** : , MODBUS (Serial & TCP/IP) [SNMP (V1.0, V2.0, V3.0), NTP & SNTP , IEC 61850 (ED1, ED2)] is preffered.	No.	1	22				
A2		24V, 150 AH VRLA Type Storage Battery (Type-1)	Set	1	15				
A3		24V, 200 AH VRLA Type Storage Battery (Type-2)	Set	1	7				
A4		DCDB with 2 Incomers and 15 Outgoing Feeders	No.	1	22				
A5		Decommissioning of existing DC System (Battery & Battery Charger) and Installation and Commissioning of New DC System (Battery & Battery Charger and DCDB) & restoration of DC supply to existing/new DCDB	Lumpsum	1	22				
		Total of A							
B	**Instrumentation Cable for Power Supply**								

Sl. No.	Item	Description	UOM	Qty/ Substations	Total Required Quantity (A)	HSN/SAC Code	Unit Rate (B)	GST (%)	GST (INR) (C)
B1	3C X 4 mm2 power Supply Cable for extension of DC Supply	**Power Supply Cable** 3 core X 4 sq.mm. Armored multistrand Power Supply cable for extending Power Supply Preferred Make: CCI / FORT GLOSTER / FINOLEX / HAVELLS / Indian aluminum Cables / Universal Cables / Incab / Asian Cable / KEI / Polycab / Ruchika/equivalent	Meters/ Substations	100	2200				
B2		Supply, Laying and Termination of Power Supply Cables	Lumpsum	1	22				
		Total of B							
C	**Communication Cable for DC Controller**								
C1	4P X 0.36 mm2 Armored Communication Cable for RS485	Communication Cable for DC system 4P X 0.36 Sq.mm Armored multistrand Pair and Overall shielded, for DC Controller communication with Purchaser's RTU. Preferred Make: Belden/LAPP/SATYAM /Finolex / Polycab / Mescab /Digi Link/ Equivalent	Meters/ Substations	25	550				
C2		Supply, Laying and Termination of Communication cable for DC Controller	Lumpsum	1	22				
		Total of C							
D	**Training (10 Man-days of Trainer)**								
D1	Training	DC System – On-site Training	Man-days		1				
		Total of D							

Sl. No.	Item	Description	UOM	Qty/ Substations	Total Required Quantity (A)	HSN/SAC Code	Unit Rate (B)	GST (%)	GST (INR) (C)
E	**Mandatory Spares**								
1	**Mandatory Spares**	Battery Charger - Rectifier Unit	Sets	10	3				
2		DC MCB	Nos.	20	7				
3		DC System Controller	Sets	5	2				
4		Battery (24V)	Nos.	10	3				
5		Surge Protection Device (SPD)	Nos.	20	7				
6		Indicating LED Lamps as per the design	Nos.	10	3				
Total of E									
Grand Total (A+B+C+D+E									

Price Schedule & BOM of proposed DC System for 33/11kV Substation (Phase # 2)

Sl. No.	Item	Description	UOM	Qty/ Substations	Total Required Quantity (A)	HSN/SAC Code	Unit Rate (B)	GST (%)	GST (INR) (C)	Gross Unit Rate (D=B+C)	Gross Price (E=A*D)
A	**24 V DC System Battery, Battery Charger, DCDB and Microprocessor Based Controller**										
A1	**24 V DC SYSTEM**	24V, 70 Amp Float Cum Boost Charger with Microprocessor based Controller (N+1) Controller OS, Application Software and configuration Tool licenses **Protocols** : , MODBUS (Serial & TCP/IP) [SNMP (V1.0, V2.0, V3.0), NTP & SNTP , IEC 61850 (ED1, ED2)] is preffered.	No.	1	67				0	0	0
A2		24V, 150 AH VRLA Type Storage Battery (Type-1)	Set	1	50				0	0	0
A3		24V, 200 AH VRLA Type Storage Battery (Type-2)	Set	1	17				0	0	0
A4		DCDB with 2 Incomers and 15 Outgoing Feeders	No.	1	67				0	0	0
A5		Decommissioning of existing DC System (Battery & Battery Charger) and Installation and Commissioning of New DC System (Battery & Battery Charger and DCDB) & restoration of DC supply to existing/new DCDB	Lumpsum	1	67				0	0	0
		Total of A									**0**
B	**Instrumentation Cable for Power Supply**										

Sl. No.	Item	Description	UOM	Qty/ Substations	Total Required Quantity (A)	HSN/SAC Code	Unit Rate (B)	GST (%)	GST (INR) (C)	Gross Unit Rate (D=B+C)	Gross Price (E=A*D)
B1	3C X 4 mm2 power Supply Cable for extension of DC Supply	**Power Supply Cable** 3 core X 4 sq.mm. Armored multistrand Power Supply cable for extending Power Supply Preferred Make: CCI / FORT GLOSTER / FINOLEX / HAVELLS / Indian aluminum Cables / Universal Cables / Incab / Asian Cable / KEI / Polycab / Ruchika/equivalent	Meters/ Substations	100	6700				0	0	0
B2		Supply, Laying and Termination of Power Supply Cables	Lumpsum	1	67				0	0	0
		Total of B									**0**
C	**Communication Cable for DC Controller**										
C1	4P X 0.36 mm2 Armored Communication Cable for RS485	Communication Cable for DC system 4P X 0.36 Sq.mm Armored multistrand Pair and Overall shielded, for DC Controller communication with Purchaser's RTU. Preferred Make: Belden/LAPP/SATYAM /Finolex / Polycab / Mescab /Digi Link/ Equivalent	Meters/ Substations	25	1675				0	0	0
C2		Supply, Laying and Termination of Communication cable for DC Controller	Lumpsum	1	67				0	0	0
		Total of C									**0**
D	**Training (10 Man-days of Trainer)**										
D1	Training	DC System – On-site Training	Man-days		1				0	0	0

Sl. No.	Item	Description	UOM	Qty/ Substations	Total Required Quantity (A)	HSN/SAC Code	Unit Rate (B)	GST (%)	GST (INR) (C)	Gross Unit Rate (D=B+C)	Gross Price (E=A*D)
		Total of D									**0**
E	**Mandatory Spares**										
1	**Mandatory Spares**	Battery Charger - Rectifier Unit	Sets	7	7				0	0	0
2		DC MCB	Nos.	13	13				0	0	0
3		DC System Controller	Sets	3	3				0	0	0
4		Battery (24V)	Nos.	7	7				0	0	0
5		Surge Protection Device (SPD)	Nos.	13	13				0	0	0
6		Indicating LED Lamps as per the design	Nos.	7	7				0	0	0
		Total of E									**0**
		Grand Total (A+B+C+D+E)									**0**

End of Section-E