



NIT No.: TPNODL/OT/2021-22/041 Dtd.22.07.2021

Open Tender Notification

For

SUPPLY OF POWER TRANSFORMER 5 MVA, 33/11KV

Tender Enquiry No.: TPNODL/OT/2021-22/041 Dt. 22.07.2021

Due Date for Tender Fee: 26.07.2021 [15:00 Hrs.]

Due Date for Bid Submission: 03.08.2021 [15:00 Hrs.]

**TP NORTHERN ODISHA DISTRIBUTION LIMITED
(A TATA Power and Odisha Government Joint Venture)
Contracts & Material Management Department,
Corporate Office, Januganj, Balasore-756019**

Procedure to Participate in Tender

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Tender Enquiry No- TPNODL/OT/2021-22/041

Tender Enquiry No.	Work Description	EMD (Rs.)	Tender Fee (Rs.)	Last Date and Time for payment of Tender Fee
TPNODL/OT/2021-22/041	Supply of 5MVA , 33/11 KV Power Transformer as per specification, Quantity 4 nos.	2,00,000.00/-	5,000	26.07.2021, 15:00 Hrs

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 Northern Odisha Distribution Limited
Bank Name – Union Bank of India
Branch Name – Balasore Branch
Account No – 500601010280332
IFSC Code – UBIN0550060

E-mail with necessary attachment to be sent to jitendra.mishra@tpnodl.com with copy to vipin.Chauhan@tpnodl.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 TPNODL 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 only through TPNODL E-Tender system (Ariba). User manual to guide the bidders to submit the bid through E-Tender system (Ariba) is also enclosed.



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No e-mail or verbal correspondence will be responded. 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 TPNODL 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.

Any payment of Tender Fee / EMD by Bidder who have not done the prerequisite will not be refunded.

Also all future corrigendum to the said tender will be informed on Tender section on website <https://www.tpnodl.com>

CONFIDENTIAL



NIT No.: TPNODL/OT/2021-22/041 Dtd.22.07.2021

OPEN TENDER NOTIFICATION

FOR

SUPPLY OF POWER TRANSFORMER 5 MVA, 33/11KV

**Tender Enquiry No.: TPNODL/OT/2021-22/041
Dtd.22.07.2021**

Due Date for Bid Submission: 03.08.2021 [15.00 Hrs.]

**TP NORTHERN ODISHA DISTRIBUTION LIMITED
(A Tata Power and Odisha Government Joint Venture)**

**Contracts & Material Management Department
Corporate office: Januganj, Balasore, Odisha-756019**

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1.0 Event Information

1.1 Scope of work

Bids are invited against the Open Tenders through e-tender bidding process from interested Bidders for entering into Supply as per the details mentioned below:

Line Item no.	Description	EMD Amount (Rs.)	Tender Fee (Rs.)
1	Supply of 5MVA , 33/11 KV Power Transformer as per specification, Quantity 4 nos.	2,00,000	5,000

1.2 Availability of Tender Documents

Please refer "Procedure to participate in the e-tender".

1.3 Calendar of Events

(a)	Last Date of receipt of Tender Fee	26.07.2021 ; 15:00 Hrs
(b)	Date & Time of Pre-Bid Meeting (If any)	Not Applicable due to COVID-19, Queries to be answered through e-mail/TPNODL Tender website.
(c)	Last Date of receipt of pre-bid queries, if any	28.07.2021 up to 15:00 Hrs
(d)	Last Date of Posting Consolidated replies to all the pre-bid queries as received	30.07.2021 up to 18:00 Hrs
(e)	Last date and time of receipt of Bids	03.08.2021 up to 15:00 Hrs
(f)	Date & Time of opening technical bids & EMD	03.08.2021 up to 15:30 Hrs
(g)	Date & Time of opening of Price of qualified bids	Will be notified to the successful bidders through our website / e-mail.

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 TPNODL, the last date of submission of bids and date of opening of bids will be the 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 in case the tender is downloaded from website
- 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 (In case any of these documents is not available with the bidder, same to be explicitly mentioned in the 'Schedule of Deviations')
- 1.4.9 **Sample Submission/Demonstration: TPNODL Reserves the right to seek samples and/or demonstration of offered equipment during Technical Evaluation. Samples/demonstration will be sought by Technical team doing Technical Evaluation. The same may have to**

submitted/arranged on urgent basis at Central Store, TPNODL, Sovarampur, Balasore, Odisha-756001. Bidder not able to submit sample/perform demonstration in time, may get Technically rejected.

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:-

- 1.6.1 EMD of requisite value and validity
- 1.6.2 Tender fee of requisite value
- 1.6.3 Price Bid as per the Price Schedule mentioned in Annexure-I
- 1.6.4 Necessary documents against compliance to Qualification Requirements mentioned at Clause 1.7 of this Tender Document.
- 1.6.5 Filled in Schedule of Deviations as per Annexure III
- 1.6.6 Filled in Schedule of Commercial Specifications as per Annexure IV
- 1.6.7 Receipt of Bid within the due date and time

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

1.7 Qualification Criteria

- a) *The bidder should have an average annual turnover of Rs.6 Crores in last three financial years. Copy of audited Balance Sheet and P&L Account to be submitted in this regard.*
- b) *Bidder must be a BEE Certified OEM of Power Transformer of same or Higher Ratings with manufacturing facility/assembly in India. The bidder should have oil filling machine under vacuum. TPNODL reserves the right to inspect the said manufacturing facility as a proof of compliance to this parameter. The bidder has to furnish the Self-undertaking in this regard.*
- c) *The bidder should have valid BEE certification with successful Type Test Report (TTR) conducted from CPRI / ERDA/ International Accredited Laboratory and shall furnish the same as a part of the Technical Bid. The type tests should have been conducted on the equipment / material of the same design. The type tests should have been conducted within 5 years prior to the date of bid opening. Time period for type test can be extended by another 5 years as a special case, if there is no change in design / material of construction (MOC). In case the type test reports furnished are not for the quoted equipment / material but for the equipment / material with higher voltage class and/or different capacity, then type test shall be carried out for the offered equipment / material from CPRI/ERDA / International Accredited Lab without any cost implication to the owner and the Type Test reports and relevant drawings duly approved by the Type Testing agency shall be furnished within 3 months from the date issue of PO.*
- c) *The bidder should have supplied the Power Transformer of 3 nos. quantity of similar or higher rating during any one of the financial year out of the immediate past three financial years. Copy of work order / completion certificate to be submitted in this regard*

- d) *The bidder should have performance certificates from at least 2 reputed companies for similar or higher rating of work. The work against these issued certificates should be completed in last seven years from the date of bid submission. In case the bidder has a previous association with TPNODL/ NESCO for similar products and services, the performance feedback for that bidder by TPNODL User Group shall only be considered irrespective of performance certificates issued by any third organization*
- e) *The bidder shall have In-house testing facilities as per TPNODL specifications. Bidder must submit undertaking in this regard.*

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, TPNODL 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 TPNODL. This includes all bidding information submitted to TPNODL. All tender documents remain the property of TPNODL and all suppliers are required to return these documents to TPNODL 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.
- The bids will be evaluated commercially on the overall all-inclusive lowest cost for the complete tender BOQ as calculated in Schedule of Items [Annexure I]. TPNODL reserves the 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 of each line item as per schedule of item [Annexure-I]. Failing to do so TPNODL may reject the bid.

NOTE: In case of a new bidder not registered, factory inspection and evaluation shall be carried out to ascertain bidder's manufacturing capability and quality procedures. However TPNODL 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 TPNODL 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. TPNODL shall respond to the clarification raised by various bidders and the replies will be sent to all participating bidders through e-mail.

Bids shall be submitted in 3 (Three) parts:

FIRST PART: “EMD” of Rs. 2,00,000/- (Rupees Two Lakh only) shall be submitted. The EMD shall be valid for 210 days from the due date of bid submission in the form of BG / Bankers Pay Order favoring ‘TP NORTHERN ODISHA DISTRIBUTION LIMITED’, payable at Balasore only. The EMD has to be strictly in the format as mentioned in General Condition of Contract, failing which it shall not be accepted 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.

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

Beneficiary Name – TP Northern Odisha Distribution Limited
Bank Name – Union Bank of India
Branch Name – Balasore Branch
Account No – 500601010280332
IFSC Code – UBIN0550060

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)*

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

THIRD PART: “PRICE BID” shall contain only the price details and strictly in format as mentioned in Annexure I 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.

FOR BIDS INVITED THROUGH E-PROCUREMENT PORTAL:

The interested bidders are requested to obtain user name and password for purpose of bid submission through e-procurement portal of TPNODL.

Bids have to be mandatorily submitted only through e-procurement portal of TPNODL. Bids submitted through any other form/ route shall not be admissible

The EMD in the form of BG shall be submitted in original hard copy and then placed in sealed envelope which shall be clearly marked as below:



NIT No.: TPNODL/OT/2021-22/041 Dtd.22.07.2021

EMD

“Supply of Power Transformer 5MVA, 33/11KV”

Please mention our Enquiry Number:- TPNODL/OT/2021-22/041 Dtd.22.07.2021 on the Tender and drop the same at **TP NORTHERN ODISHA DISTRIBUTION LIMITED, (A Tata Power and Odisha Government Joint Venture), HOD (Contracts), Corporate office: Januganj, Balasore, Odisha-756019.**

The envelope shall be addressed to:

**HOD (Contracts)
TP NORTHERN ODISHA DISTRIBUTION LIMITED
(A Tata Power and Odisha Government Joint Venture)
Corporate office: Januganj, Balasore, Odisha-756019**

The envelope shall also bear the Name and Address of the Bidder along with our Tender No. and subject.

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 the 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

All the bidders are requested to send their pre-bid queries (if any) against this tender through e-mail within the stipulated timelines. The consolidated reply to all the queries received shall be posted on TPNODL website by the stipulated timelines as detailed in calendar of events.

Communication Details:

Package Owner: Contracts & Material Management

Name: Mr. Jitendra Kumar Mishra
Contact No: 9451391583
E-Mail ID: jitendra.mishra@tpnodl.com

HOD: Contracts

Name: Mr. Vipin Chauhan
Contact No: 9717393121
E-Mail ID: Vipin.chauhan@tpnodl.com

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 TPNODL. 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.

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 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.

Not with standing clause above, the TPNODL 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 the TPNODL 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 favour of 'TP NORTHERN ODISHA DISTRIBUTION LIMITED', payable at Balasore only
- 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 of:

- a) The bidder withdraws its bid during the period of specified bid validity.
- Or**
- b) The case of a successful bidder, if the Bidder does not
 - i) accept the purchase order, or
 - ii) furnish the required performance security BG

3.9 Type Tests (if applicable)

The type tests specified in TPNODL 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 TPNODL.

4.0 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 TPNODL's processing of Bids or award decisions may result in the rejection of the Bidder's Bid.

4.2 Technical Bid Opening

Bids shall be opened as per the schedule mentioned in Calendar of Events. In case of limited tenders, the bids shall be opened internally by TPNODL. Owing to COVID Scenario, in case of Open Tenders also, the bids shall be opened internally by TPNODL. Technical bid must not contain any cost information whatsoever.

First the "EMD" will be checked. 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. The salient particulars of the techno commercial bid will be read out at the sole discretion of TPNODL

4.3 Preliminary Examination of Bids/ Responsiveness

TPNODL 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. TPNODL 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, TPNODL 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 TPNODL and/or the TPNODL 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, TPNODL may, at its discretion, ask the Bidder for a clarification on its Bid for any deviations with respect to the TPNODL 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 TPNODL. After all techno commercial issues are clarified, the date of price bid opening will be intimated to the technically accepted bidders and same shall also be notified at TPNODL website.

4.5 Price Bid Opening

Price bids will be opened at the stipulated date and time. 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 TPNODL without any further correspondence in this regard.

4.7 Reverse Auctions

TPNODL 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 and reserves the rights to conduct the manual negotiation with the BA who is declared L1 after Reverse Auction. 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.

5.0 Award Decision

TPNODL 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 rate contract / purchase order / LOI solely depends on TPNODL on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that TPNODL may deem relevant.

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

In case any supplier's services or quality of material is / are found unsatisfactory during the delivery process, the award will be cancelled and TPNODL reserves the right to award other suppliers who are found fit.

6.0 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 (if any)
5. Technical Specifications (Annexure II)
6. Inspection Test Plan (if any)
7. Acceptance Form for Participation in Reverse Auction (Annexure VI)
8. General Conditions of Contract (Annexure VII)

7.0 Post Award Contract Administration

7.1 Special Conditions of Contract

- Post award of Purchase Order(PO), Business Associate (BA) shall submit applicable Performance Bank Guarantee as per GCC within 15 days. PBG applicable shall 5% of Contract Value. PBG submitted, shall be released after completion of applicable guarantee period plus one month.
- Guarantee period shall be as per technical specifications.
- BA shall submitted the GTP/ drawing within 7 days from date of issuance of order/ RC. Total time for TPNODL for approval of GTP/ drawing after first submission shall be 7 days from the date of submission and 4 days from the date of subsequent submission in case drawings/ GTP are required to be resubmitted. In case BA does not submit the drawing as per above timelines, then TPNODL reserve the right to cancel issued contract / PO and also reserve the right to forfeit EMD / PBG.
- Delivery period shall be 120 days from date of approval of CAT-A / drawing / GTP.
- TPNODL reserves the rights to short close the issued Purchase Order, in case of any quality issues.
- Quotation in all BOM items is mandatory, and bid shall be rejected if any line of found blank in un price bid.
- Any change in statutory taxes, duties and levies shall be borne by TPNODL.
- All other terms and conditions of TPNODL GCC shall be applicable.

7.2 Drawing Submission & Approval

The relevant drawings and GTPs need to be submitted as per special condition of contract mentioned in point no. 7.1

7.3 Delivery Terms

The delivery of material shall be made as per special condition of contract mentioned in point 7.1.

7.4 Warranty Period

Guarantee/Warranty Period of the supplied material shall be as per technical specification attached with this tender.

7.5 Payment Terms

On delivery of the materials in good condition and certification of acceptance by certified official, Associate shall submit the Bills/ Invoices in original in the name of TP NORTHERN ODISHA DISTRIBUTION LIMITED to AGM (Elect.) / Executive Engineer (Elect.), ESD, TPNODL, Balasore. The payment shall be released within 45 days from the date of submission of certified bills/ invoices.

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.

7.7 Ethics

- TPNODL is an ethical organization and as a policy TPNODL 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.

- TPNODL 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 GCC attached at Annexure IX for more information.

Any ethical concerns with respect to this tender can be reported to the following e-mail ID: ceoffice@tpnodl.com

8.0 Specification and standards:

Attached separately with tender.

9.0 General Condition of Contract

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

10.0 Safety

Safety related requirements as mentioned in our safety Manual is put in the Company's website and same shall be strictly followed.

<http://www.tpnodl.com>

All Associates shall strictly abide by the guidelines provided in the safety manual at all relevant stages during the contract period.

ANNEXURE I
Schedule for Items

S. No.	Item Description	Qty.	Unit	HSN /SAC Code	Unit Ex-Work Price (Rs./Unit)	GST (Rs/Unit)	Other Taxes and Duties (Rs/Unit)	Freight & Insurance Charges (Rs/Unit)	GST on Freight & Insurance Charges (Rs/Unit)	All Inclusive Unit Rate (Rs.)	Total All Inclusive Value (Rs.)
1	Supply of 5 MVA, 33/11 KV Power Transformer as per specification	4	Each								
Total All Inclusive Value (Rs.)											

Signature & Seal of the Bidder

NOTE:

- The quantity mentioned above is for evaluation purpose only and may vary during the execution. Purchase Orders against this Supply shall be issued by TPNODL as per actual requirement.
- Price should be firm till the final obligation of the contract.
- The unit price with GST in column no. 7, is landed price FOR TPNODL Odisha Locations. Exact delivery location shall be specified in the Purchase Order.
- The bidders are advised to quote prices strictly in the above format. Failing to do so, bids are liable for rejection.
- The bidder must fill each and every column of the above format. **Mentioning "extra/inclusive" in any of the column may lead for rejection of the price bid.**
- No cutting/ overwriting in the prices is permissible.

ANNEXURE II

Technical Specifications attached after GCC with the tender.

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 TPNODL'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 Excise Duty	Yes / No (If Yes, indicate % rate)
1d.	Sales tax applicable at concessional rate	Yes / No (If Yes, indicate % rate)
1e.	Octroi payable extra	Yes / No (If Yes, indicate % rate)
1f.	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 technical 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.)

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 RFQ	
3	Company profile/ organogram	
4	Signed copy of this RFQ 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	

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, TPNODL 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. TPNODL 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. TPNODL will make every effort to make the bid process transparent. However, the award decision by TPNODL would be final and binding on the supplier.
3. The bidder agrees to non-disclosure of trade information regarding the purchase, identity of TPNODL, 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 TPNODL.
6. In case of intranet medium, TPNODL shall provide the infrastructure to bidders. Further, TPNODL 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 TPNODL.
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 TPNODL 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 the auction event shall be considered by TPNODL.
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

General Conditions of Contract

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1.0 ORGANIZATIONAL VALUES

The Tata Group has always been a value driven organization. These values continue to direct the Group's growth and businesses. The six core Tata Values underpinning the way we do business are:

Integrity - We must conduct our business fairly, with honesty and transparency. Everything we do must stand the test of public scrutiny.

Understanding - We must be caring, respectful, compassionate and humanitarian towards our colleagues and customers around the world and always work for the benefit of India.

Excellence - We must constantly strive to achieve the highest possible standards in our day to day work and in the quality of goods and services we provide.

Unity - We must work cohesively with our colleagues across the group and with our customers and partners around the world to build strong relationships based on tolerance, understanding and mutual co-operation.

Responsibility - We must continue to be responsible and sensitive to the countries, communities and environments in which we work, always ensuring that what comes from the people goes back to the people many times over.

Agility - We must work in a speedy and responsive manner and be proactive and innovative in our approach.

2.0 ETHICS

In our effort towards Excellence and in Management of Business Ethics at TPNODL, an Ethics Management Team is constituted.

The main objective of the Ethics Management Team is to:

1. Record, address and allay the issues and concerns on ethics raised by different stakeholders like employees, consumers, vendors, Associates etc. by initiating immediate corrective actions.
2. Ensure proper communication of the ethics policies and guidelines through prominent displays at all offices of TPNODL and through printed declarations in all concerned documents where external stakeholders are involved.
3. Ensure proper framework of policies as preventive measures against any ethics violation recorded by them.
4. Prepare and submit MIS of all issues and concerns, corrective and preventive actions on monthly basis to the top management for their information.

All Associates and Stakeholders are requested to register any grievance on ethics violation reported to e mail id: ceoffice@tpnodl.com

2.1 Tata Code of Conduct

The Business Associate and TPNODL shall be bound by the provisions/ clauses mentioned in Tata Code of Conduct (TCoC) in all their dealings with stakeholders. The Associate is advised to go through the TCoC document available as Annexure-J.

3.0 CONTRACT PARAMETERS

3.1 Issue/Award of Contract

TPNODL awards the contract to the Associate in writing in the form of Purchase Order (PO) or Rate Contract (RC), hereafter referred as Contract, through in any or all of following modes physical handover / post / e-mail / web document / fax with all the attachments/enclosures which shall be part of the contract document.

On receipt of the contract, the associate shall return to TPNODL copy of the contract document duly signed by legally authorized representative of associate, within two days of Effective Date of Contract for contracts having contract execution time less than 30 days and within five days for all other contracts.

Note- In case of RC though, further Release Orders (RO) shall be issued by TPNODL on RC rates and terms & Conditions as per the requirement of TPNODL.

3.2 Contract Commencement Date

The date of issue/award of contract shall be the Effective Date of Contract or Contract Commencement date.

3.3 Contract Completion Date

The date of expiry of Guarantee Period shall be deemed as the Contract Completion Date.

3.4 Contract Period/Time

The period from Contract Commencement Date to Contract Completion Date shall be deemed as the Contract Period/Time.

3.5 Contract Execution Completion Date

The stipulated date for completing the supply as per schedule of quantities shall be deemed as the Contract Execution Completion Date.

3.6 Contract Price /Value

The total all inclusive price/value mentioned in the PO/RC is the Contract Price/Value and is based on the quantity, unit rates and prices quoted and awarded and shall be subject to adjustment based on actual quantities supplied and accepted and certified by the authorized representative of the company unless otherwise specified in schedule of quantities or in contract documents.

3.7 Contract Document

The Contract Document shall mean and include but not limited to the following:

- NIT/Tender Enquiry, QR, Instruction to Bidders, Special Condition of Contract (SCC) of tender, GCC, Technical & Commercial Specifications including relevant annexure and attachments).
- Bids & Proposals Received from Associate including relevant annexure/attachments.
- RC/PO with agreed deviations from the tender/bid documents.
- All the Inspection and Test reports, Detailed Engineering Drawings.
- Material Dispatch Clearance Certificate (MDCC).
- Minutes of Meeting (MoM)

3.8 Contract Language

All documents, instructions, catalogues, brochures, pamphlets, design data, norms and calculations, drawings, operation, maintenance and safety manuals, reports, labels, on deliveries and any other data shall be in English Language.

The Contract documents and all correspondence between the TPNODL, Third Parties associated with the contract, and the Associate shall be in English language.

However, all signboards required indicating "Danger" and/or security at site and otherwise statutory required shall be in English, Hindi, and local languages.

3.9 Reverse Auction

TPNODL 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 in Annexure F. The bidders along with the tender document shall mandatorily submit a duly signed copy of the Acceptance Form as mentioned in the Annexure J as a token of acceptance for the same.

4.0 Scope of Work

All the activities that are to be undertaken by the Associate to realize the contractual deliverables in completeness form Scope of Work. Following clauses list, but not limited to, major requirements of the scope of work.

The associate shall satisfy himself and undertake fully the technical/commercial requirements of items to be supplied as listed in the Schedule of Quantities together with the tests to be performed /test reports to be furnished before dispatch, arrangement of stage and final inspections during manufacturing as per terms and conditions of contract, technical parameters & delivery terms and conditions including transit insurance to be met in order to fully meet TPNODL's requirements.

Completeness: Any supplies and services which might have not been specifically mentioned in the Contract but are necessary for the scope mentioned in Special Terms & Conditions and/or completeness of the works at the highest possible level, including any royalties, license fees &

compensation to be paid, whether incurred by the associates or by a third party for the work covered in the scope, regardless of when incurred, shall be supplied/provided by the associate without any extra cost and within the time schedule for efficient, smooth and satisfactory operation and maintenance of the works at the highest possible level under Indian conditions (but according to international standards for facility of this type), unless expressly excluded from the scope of supplies and services in this Contract.

TPNODL have the right, during the performance of the Contract, to change the scope and/or technical character of the Project and/or of the supplies and services stipulated in the Contract by submitting a request in writing to the Associate. The Associate shall, within fifteen days of receipt of such request from the TPNODL, provide Purchaser with a reasonably detailed estimate of the cost of the change outlined in the request.

In the event, TPNODL requests a change, the Contract price and time shall be adjusted upwards or downwards, as the case may be and shall be mutually agreed to. The associate shall not be entitled to any extension of time unless such changes adversely affect the time schedule.

The Associate shall not proceed with the changes as requested till adjustment of contract price and time schedule where so applicable in terms of or otherwise directed by the TPNODL.

4.1 Bid Evaluation- Commercial & Technical

TPNODL reserves the right to evaluate the bid on below parameters as per the requirement:

Commercial Evaluation: The bid shall be evaluated on the basis of Qualifying Requirement parameters and other commercial parameters as mentioned in tender.

Technical Evaluation: The bid shall be evaluated on the parameters and not limited to Bidder Experience, Bidder Performance with other utility/company, internal performance feedback, Technical Specification, General Technical Parameters (GTP), Layout, Drawings etc.

TPNODL reserves the right to carry out Factory Evaluation of Manufacturer along with the Visit to executed Sites for further evaluation to ascertain bidder's manufacturing capability, quality procedures & Performance of executed works.

5.0 PRICES/RATES/TAXES

Unless specified elsewhere in the contract document, the prices/rates are inclusive of cost of finished product for which MDCC will be issued by TPNODL, packaging and forwarding charges, freight and transit insurance charges covering loading at Associate's works, transportation to TPNODL store/site & unloading & delivery at TPNODL stores/TPNODL site, cost of documentation including all the relevant test certificates and other supportive documents to be furnished.

The Prices/Rates are inclusive of all taxes, levies, cess and duties, particularly Goods and Services Tax as applicable. All government levy / taxes shall be paid only when the invoice is submitted according to the relevant act.

The prices/rates shall remain firm till actual completion of entire supply of goods/material/equipment as per contract is achieved and shall remain valid till the completion of the contract.

The prices shall remain unchanged irrespective of TPNODL making changes in quantum in all or any of the schedules of items of contract.

5.1 Changes in Statutory Tax Structure

If rate of any or all of the statutory taxes and duties applicable to the contract changes, such changes shall be incorporated by default if the changes occur within the contract execution time and shall be applicable if the contract is executed by the Associate within the Contract Execution Time.

For execution of contracts beyond contract execution time, where the delay is not attributable to TPNODL no upward revision in tax /duties shall be considered irrespective of changes in the statutory tax structure either within the contract execution time or beyond. However, in such cases, benefits due to any downward revisions in statutory tax rates shall be passed on to TPNODL.

6.0 TERMS OF PAYMENT

On delivery of the materials in good condition and certification of acceptance by TPNODL official, Associate shall submit the Bills/Invoices in original in the name of "TP Northern Odisha Distribution Ltd" to invoice desk, complete with all required documents as under:

- Test Reports (4 sets).
- MDCC issued by TPNODL.
- Packing List.
- Drawing and Catalogue.
- Guarantee/Warrantee Card.
- Delivery Challan.
- O&M Manual.
- Copy of Order.
- Minutes of Meeting.
- E-Way challan (if applicable)

Bills/ invoices shall mention Supplier's GST Number. TPNODL will make 100% payment within 45 days of submission of the Bill/Invoice complete in all respects and along with all the requisite documents mentioned above, subject to condition that Associate has furnished the requisite Security-cum-Performance Guarantee as stipulated in the contract.

6.1 Quantity Variation

Payment will be made on the basis of actual quantity of supplies/actual measurement of works accepted by TPNODL and not on the basis of contract quantity.

6.2 Full and Final Payment

Full & Final Payment in all contracts shall be made subject to the associate submitting “No Demand Certificate” in the format as per Annexure-C.

7.0 MODE OF PAYMENT

Payment shall be made RTGS / NEFT whichever of the two modes chosen by the Associate, in favour of Associate’s Bank Account on TPNODL records, on whose name Contract has been issued. Those Associates opting for the RTGS mode shall submit the details of Bank Account and other details as per annexure G. Further, for any payments made, TPNODL is not responsible for any consequences/disputes Associate have among the owners channel partners, sub-Associates and all such dispute/concerns shall be settled solely by the Associate.

8.0 SECURITY CUM PERFORMANCE DEPOSIT

Associates shall submit within 15 days from the effective date of issue of PO/RC, Security Performance Bank Guarantee (SPBG) in the format as per Annexure B of this document from banks acceptable to TPNODL for:

- 3% of the RC value as per prevailing Govt. Orders however same can be change or enhanced in case of any change in Govt. direction. BA is supposed to pay the difference of PBG amount as and when demanded by TPNODL.

This shall remain valid till the Guarantee period plus one month.

- For PO/RC values less than Rs. 5 lacs, Associate may request for deduction of amount equivalent to SPBG value from their first invoice. Such amount shall be withheld by TPNODL while processing the invoice and shall be released after completion of Guarantee Period plus one month.
- For PO/RC values less than Rs. 3 lacs, the clause (8.0) for Security cum Performance Bank Guarantee (SPBG) shall not be applicable.
- In case of RC (Rate Contract) after the expiry of RC validity, Associate shall have to submit SPBG. However, the Associate has the option to re-submit the SPBG as per actual RO (Release Order) value issued against the RC, valid for Guarantee Period plus one month. The Guarantee Period shall be considered as per the last RO issued against the said RC. The original SPBG as submitted against the RC shall be released on submission of the new SPBG to TPNODL. Alternatively, Associate may extend the validity of original SPBG only till the requisite period, i.e. Guarantee Period plus one month.

9.0 STATUTORY COMPLIANCE

9.1 Compliance to Various Acts

Associate should ensure adherence to all applicable laws, rules and regulation applicable under this contract from time to time. In case of violation any risk, costs etc shall be in associates account and keep TDPPL indemnified always till completion of contracts.

9.2 SA 8000

As TPNODL is SA 8000 compliant, it expects its Associates to follow guidelines of SA 8000:2014 on the following aspects

1. Child Labour
2. Forced or Compulsory Labour
3. Health & Safety
4. Freedom of Association & Right to Collective Bargaining
5. Discrimination
6. Disciplinary Practices
7. Working Hours
8. Remuneration
9. Management System

9.3 Affirmative Action

TPNODL appreciate and welcome the engagement/employment of persons from SC/ST community or any other deprived section of society by their business associates.

Relaxation in Contract Clauses under Affirmative Action for SC/ ST Business Associates**

TPNODL believes that inclusive growth is the key to sustainable development, and to promote the same Policy on Affirmative Action for Scheduled Caste & Scheduled Tribe Communities has been adopted across the company.

Under the same pre-text, and to promote entrepreneurship among SC/ST community TPNODL has taken initiative by proposing relaxations in contract clauses as per below:

S. No	Initiative	for SC/ ST BA's	Guideline Document
1	Tender Fees	100% waiver for SC/ST community	All Open Tenders
2	Earnest Money Deposit	50 % relaxation of estimated EMD value	All limited and Open Tenders
3	Performance Bank Guarantee	50% relaxation in PBG for order value above 50 lacs else 25% relaxation	All limited and Open tenders
4	Turnover	25% relaxation in company turnover under qualifying requirement criteria	All Open Tenders

****Classification of BAs under SC/ST shall be governed under following guidelines:**

- Proprietorship/ Single Ownership Firm: Proprietor of the firm should be from SC/ST community. Governing document shall be duly audited balance Sheet for the last FY bearing the name of proprietor.

- Partnership Firm: Only such firms shall qualify which have SC/ST partners holding equal to or more than 50% of the total ownership pattern of the firm. Governing document shall be Partnership Deed and audited balance sheet/ ITR for last FY.
- Private limited company: Only such firms shall qualify which have SC/ST directors holding equal to or more than 50% of the total ownership pattern of the firm. Governing document shall be Memorandum of Understanding (MoU) and/or Article of Association (AoA).

Governing document shall be Memorandum of Understanding (MoU) and/or Article of Association (AoA).

Note: Certification from SC/ST commission shall be required for deciding upon SC/ST status of a person.

9.4 ISO 14001

The vendor to confirm whether their organization is ISO 14001 certified. If not, the Vendor must certify that the handling, use and disposal of their product/ by-products conform to practices consistent with sound environment management and local statues. The Vendor shall ensure that all the wastes are disposal in environmental friendly way with strict compliance to applicable laws including adherence to MoEF guidelines with respect to the disposal of batteries, lead waste, copper cables, ash, waste oil, e-waste etc. which shall be disposed through MoEF approved parties only. The vendor shall also dispose off the e-waste generated at the end of the product life cycle at its own costs and risk as per the MoEF guidelines/ Orders

10.0 QUALITY

10.1 Knowledge of Requirements

The Associate shall be deemed to have carefully examined and to have knowledge of the equipment, the general and other conditions, specifications, schedules, drawings, etc. forming part of the Contract and also to have satisfied himself as to the nature and character of the work to be executed and the type of the equipment and duties required including wherever necessary of the site conditions and relevant matters and details. Any information thus procured or otherwise obtained from TPNODL/Consultants shall not in any way relieve the Associate from his responsibility and executing the works in accordance with the terms of contract.

10.2 Material/Equipment/Works Quality

The items / works under the scope of the Associate shall be of the best quality and workmanship according to the latest engineering practice and shall be manufactured from materials of best quality considering strength and durability for their best performance and, in any case, in accordance with the specifications set forth in this Contract. All material shall be new. Substitution of specified material or variation from the process of fabrication/ construction/ manufacture may be permitted but only with the prior written approval of the TPNODL.

10.3 Adherence to Rules & Regulations

The Associate shall procure and/or fabricate/erect all materials and equipment in accordance with all requirements of Central and State enactment, rules and regulations governing such work in India

and at site. This shall not be construed as relieving the Associate from complying with any requirement of TPNODL as enumerated in the Contract which may be more rigid than and not contrary to the above mentioned rules, nor providing such construction as may be required by the above mentioned rules and regulations. In case of variance of the Technical Specification from the laws, ordinance, rules and regulations governing the work, the Associate shall immediately notify the same to the TPNODL. It is the sole responsibility of the Associate, however, to determine that such variance exists. Wherever required by rules and regulations, the Associate shall also obtain the statutory authorities' approval for the plant, machinery and equipment to be supplied by the Associate.

10.4 Specifications and Standards

The Associate shall follow all codes and standards referred in the Contract Document. Codes and standards of other may be followed by the Associate with the prior written approval of TPNODL, provided materials, supplies and equipment according to the standard are equal to or better than the corresponding standards specified in the Contract.

Brand names mentioned in the Contract documents are for the purpose of establishing the type and quality of products to be used. The Associate shall not change the brand name and qualities of the bought out items without the prior written approval of the TPNODL. All such products and equipment shall be used or installed in strict accordance with original manufacturer's recommendations, unless otherwise directed by the TPNODL. In any circumstances the codes, specimen and standards prescribed by any government agency should not be violated.

11.0 INSPECTION/PARTICIPATION

11.1 Right to Carry Out Inspection

TPNODL reserves the right to send its representatives for inspection or participation at various stages of contract execution listed below, applicable as per contract construction.

- During basic design and detail engineering of material/ Equipment carried out by Associate /Outsourced Agencies.
- During manufacturing stages of the product at Associate's/Associate's Outsourced Agency's Plant/Facility.
- During Pre-dispatch Inspection and Testing of finished/manufactured product at Associate's/Associate's outsourced Agency's Plant/Facility.
- During Installation & Commissioning Activities/Stages.
- Prior to Clearing of the completed installation for commissioning.
- Any other stage as find appropriate by TPNODL during contract execution time.

All inspections and participations shall be carried out by TPNODL giving written intimation to the Associate or receiving appropriate advance written inspection call from the Associate, unless otherwise specified elsewhere in the contract document.

MDCC request shall be submitted by BA to TPNODL at least 7 days before inspection date.

11.2 Facilitating Inspection

The Associate shall provide all opportunities and information to TPNODL's engineers to get acquainted with the technical know-how and the methods and practices adopted by the Associate in basic and detail engineering. The Associate shall provide documents, drawings, calculations etc. as may be required by TPNODL's Engineers.

The Associate shall provide free of charge office accommodation, office facilities, secretarial services, communication facilities, general and drawing office stationary, etc. as may be reasonably required by the TPNODL's engineers. Similarly, facilities shall also be provided by Associate's outsource agencies/partners/authorized dealers (collectively termed as sub associates) if such basic and detail engineering activities are carried out in the design offices of sub-Associates.

The Associate shall be responsible for the safety of employees of TPNODL/Third Party Agency when they are at the Associate's /Associate's outsource agency's plant or facility for carrying out/witnessing inspection/testing. All statutory safety precautions as applicable shall be followed by the Associate during Inspection Testing. If TPNODL inspectors are not satisfied with the safety arrangements at the plant, TPNODL have the right to call off inspection till such time corrective action is taken by the Associate.

Before raising the call for pre-dispatch final inspection and testing, the Associate shall conduct all the tests—type tests, routine tests etc-as specified in the contract document and submit copies of the test certificates to TPNODL along with the inspection call, for scrutiny of TPNODL.

The Associate and TPNODL shall jointly document all the observations, comments and action points after completion of inspection and it shall be binding on the Associate to provide compliance on all the points requiring compliance and furnish the compliance report to the designated authority of TPNODL for receiving clearance for dispatch of materials

11.3 Third Party Nomination

TPNODL may also nominate a third party for the purpose of carrying out the inspection and such an agency shall be entitled to all the rights and privileges of TPNODL as far as conducting the inspection.

11.4 Waiver of Inspections

TPNODL on its own discretion shall chose to waive off any inspection and ask the Associate to submit all the test reports as applicable as per contract specifications, related to inspection and testing of the goods ordered for scrutiny and clearance for dispatch.

11.5 Incorrect Inspection Call

In case it is observed that the material offered for inspection is not ready at the time of TPNODL inspection visit rendering it as futile, all costs towards such inspection shall be recovered from the BA. Taxes as applicable on such recoveries shall be borne by the BA.

12.0 MDCC & DELIVERY OF MATERIALS

12.1 Material Dispatch Clearance Certificate

Associate shall deliver material/goods/equipment against Supply Contracts or Supply Part of Composite/Service Contracts only after receiving Material Dispatch Clearance Certificate (hereafter termed as MDCC) issued by designated authority of TPNODL. Material delivered at TPNODL stores or at project site without a valid MDCC issued by the designated official of TPNODL shall be rejected. MDCC shall be issued to associate furnishing compliance report on the action points documented during pre-dispatch inspection and testing at Associate's/ Sub Associate's plant/ facility. In case Pre-dispatch inspection is waived at the discretion of TPNODL, then, MDCC shall be issued on receiving all the test reports-routine& type-from the Associate and finding them in order.

The associate shall include and provide for securely protecting and packing the materials so as to avoid loss or damage during handling and transport by air, sea, rail and road or any other means.

All such packing shall allow to the extent possible for easy removal and checking at Site. The associate shall take special precautions to prevent rusting of steel and iron parts during transit by sea. Gas seals or other materials shall be utilized by the associate for protection against moisture during transit of all Plant and Equipment.

Each Equipment or parts of Equipment shall be tagged with reference to the assembly drawings and corresponding part numbers. Each bale or package shall contain a packing note quoting specifically the name of the associate, item description, quantity, item / package identification.

All packing cases, containers, packing and other similar materials shall be new and supplied free by the associate and it shall not be required to be returned to the associate.

Notwithstanding anything stated in this clause, the associate shall be entirely responsible for loss, damage or depreciation or deterioration to the materials and supplies due to faulty and/or insecure packing or otherwise during transportation to the Site until otherwise provided herein.

In case of the consignments dispatched by road, the associate shall ensure that it or its subcontractors:

- i) Identify and obtain the correct type of trucks/trailers, keeping in view the nature of consignments to be dispatched.
- ii) Take such actions as may be necessary to avoid all possible chances of damages during transit and to ensure that all packages are firmly secured.

Timelines for inspection and MDCC is as below:

S. No.	Inspection	MDCC issuance time including Inspection time (max.)
1	Outside Odisha	12 days
2	Within Odisha	5 days
3	Waiver*	3 working days

* Associate is expected to raise the inspection call assuming that Inspection shall be carried out by TPNODL. The decision for waiver of inspection shall be on sole discretion of TPNODL.

12.2 Right to Rejection on Receipt

Goods/Material/Equipment delivered in condition physically damaged & incomplete as a product ordered, or not packed and transported as per the terms and conditions of the contract is liable to be rejected. Such item shall be lifted back by Associates within 15 days from receipt of rejection note from TPNODL and have to supply back the material within next 30 days or within the timeframe mutually decided by Associate and TPNODL.

If delivery of the material is beyond the agreed time, Liquidated damage clause, mentioned in this GCC separately shall be applicable; but the period for levy of LD shall be considered as per the original delivery schedule and not from the agreed timelines for material rectification.

12.3 Consignee

Unless otherwise specified in the Contract Document, Materials/Goods/Equipment shall be consigned to “SDO (Elect.), Central Store, TPNODL, Sovarampur, Balasore, Odisha-756001”

12.4 Submission of mandatory documents on Delivery

Following documents shall be mandatorily submitted by BA along with supply of material to TPNODL stores/site:

S. No.	Documents	Requisite
1	Invoice copy in original	With all consignments
2	LR copy	Wherever required
3	Packing list	With all consignments
4	MDCC	With all consignments
5	Purchase order / Release order	Signed copy
6	Test certificates	With all consignments
7	Inspection/JVR report	In case pre-dispatch inspection is conducted
8	Drawings & catalogue	With all consignments
9	Guarantee / Warrantee card	With all consignments
10	Delivery Challan	With all consignments
11	Other Documents	As applicable

12.5 Dispatch and Delivery Instructions

S. No.	Instructions
1	Purchase order/ Release order no. shall be mentioned on invoice and on material
2	TPNODL material code and material description shall be mentioned in invoice and on material.
3	“Property of TPNODL” shall be embossed on material.
4	The material shall be properly sealed and packed in standard packing as per purchase order terms & conditions.

5	The weight and quantity of material shall be mentioned wherever applicable
6	The material supplied shall be co-related with the packing list.
7	The name plate detail on equipment shall include Material code, Material description, specification detail of material [as applicable], Serial No. Year of manufacturing, PO/RO no. and date, "PROPERTY OF TPNODL, Balasore", Guarantee period and Associate's name.
8	In case of manual unloading, supplier / transporter shall deploy sufficient Labour for unloading the material at TPNODL central store. For heavy item(s), crane will be provided by TPNODL [unloading cost will be recovered from the associate].
9	The driver should have valid License and one helper in truck. All the documents of truck like registration papers, PUC etc. should be available in Truck.
10	BA representative should accompany the material and get it unloaded / stacked in his presence wherever possible.

13.0 GUARANTEE

13.1 Guarantee of Performance

Associates shall stand guarantee that the equipment and material supplied under the contract is free from design, manufacturing, material, construction, erection & installation and workmanship & quality defects and is capable of its due, rated and intended quality performance, as an integrated product delivered under the contract, for a specific period termed as Guarantee Period(as elaborated elsewhere in this clause). The Associate should also guarantee that the equipment/material is new and unused except for the usage required for the tests and checks required as part of quality assurance.

13.2 Guarantee Period

The Guarantee Period will be equipment/service/work specific and shall be as specified in the Standard Specifications of TPNODL for the equipment/material/service/work and where standard specifications are not part of contract documents or guarantee period is not specified in the standard specifications, the guarantee period shall be as per the Special Terms and Conditions of the Contract. In case of no mention of the guarantee period in standard specifications or SCC Guarantee Period will be 12 Months from the Date of Commissioning or 24 months from the date of delivery of final lot of supplies made, whichever is earlier.

13.3 Failure in Guarantee Period (GP)

If the equipment and material supplied under the contract fails to perform its due, rated & intended quality performance, during the Guarantee period, the associate is liable to undertake repair/rectify/replace the equipment and material supplied within time frame specified in the SCC or elsewhere in the contract documents at associate's cost to make the equipment and material supplied/service or work rendered under the contract of performing its due, rated and intended quality performance. If Associate fails to repair/rectify/replace the equipment or material supplied rendered under the contract, failed in Guarantee Period, TPNODL will be at liberty to get the same done at Associate's risks and costs and recover all such expenses plus the TPNODL's own charges (@ 20% of expenses incurred), from the Associate or from the "Security cum Performance Deposit" as the case may be.

If during the Warranty/ Guarantee period some parts of the supplies are replaced owing to the defects/ damages under the Warranty, the Warranty period for such replaced parts shall be until the expiry of twelve months from the date of such replacement or renewal or until the end of original Guarantee period, whichever is later.

Any repairs during the Guarantee Period shall be carried out by the Associate within 30 days of reporting the issue to Associate by TPNODL. However, if replacement of the Equipment is required, Associate shall notify the same to TPNODL within 7 days of reporting the issue by TPNODL. Thereafter, the total time for supply of new equipment/ material shall be equal to the original delivery period of that equipment/ material as specified in the Contract. In case the Associate is not able to rectify/ replace the faulty equipment/ material within the stipulated timelines as mentioned above, penalty shall be levied as per the Liquidated Damages clause mentioned in this document. The penalty amount shall be recovered from the payment due to the vendor or by encashment of the SPBG as the case may be.

13.4 Cost of repairs on failure in GP

The cost of repairs / rectification / replacement, required transportation, site inspection / mobilization / dismantling and re-installation costs as applicable, to be borne by Associate. The Associate has to ensure that the interruption in the usage of intended purpose of the equipment is minimized to the maximum extent In lieu of the time taken for repairs/rectification/replacement.

13.5 Guarantee period for Goods Outsourced

If the Associate outsources partly equipment/materials/services from third party as mutually agreed upon at the pre award stage of contract, TPNODL shall have the benefit of any additional guarantee period if provided by the third party for the part supplied/executed by them.

13.6 Latent Defect

Hidden defects in manufacturing or design of the product supplied and which could not be identified by the tests conducted but later manifested during operation of the equipment are termed as latent defects. Associates shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Company.

13.7 Support beyond the Guarantee Period

The Associate shall ensure availability of spares and necessary support for a period of at least 10 years post completion of guarantee period of equipment supplied against the contract.

14.0 LIQUIDATED DAMAGES

- a) For supplies which are of standalone use, multiple in quantities and having a single final delivery schedule, Liquidated damages shall be levied without prejudice to any of the other contractual rights of TPNODL, as described below:

For delay of each week and part thereof from the delivery schedule specified in the contract, 1% of contract value corresponding to undelivered quantity, provided full quantity is supplied within 130% of the original contract time. If full contractual quantity is not delivered within

130% of contract time for delivery, TPNODL has the right to levy LD on the entire contract value, subject to a maximum of 10% of the total contract value.

- b) For Supplies having phased delivery schedule as per contract terms, standalone use and multiple in quantities, Liquidated damages shall be levied without prejudice to any of the other contractual rights of TPNODL, as described below:

For the purpose of calculating and applying LD, each delivery lot shall be considered separately. For delay of each week and part thereof, from the delivery schedule specified for the lot, 1% of the contract value corresponding to the undelivered quantity of the lot subject to a maximum of 10% of the total contract value of the subject lot. However, if full contractual quantity is not delivered within 130% of contract time for delivery, TPNODL has the right to levy LD on the entire contract value, subject to a maximum of 10% of the total contract value. Deduction of LD shall be on landed cost i.e contract value inclusive of taxes and in pursuant statutory compliance GST would be applicable at the stipulated rate and the same shall be borne by Business Associate. In case of LD deduction, a GST invoice shall be issued by TPNODL as a proof of deduction/ recovery.

14.1 LD Waiver Request

Any request of LD waiver shall be submitted within thirty (30) days of deducting LD. Request submitted beyond the timeline shall not be entertained. The TPNODL management will review on the LD Waiver Request on the facts and will decide about the LD Waiver which may be part or the % of the LD imposed, however the TPNODL's management decision will be full and final.

15.0 UNLAWFUL ACTIVITIES

The Associate shall have to ensure that none of its employees are engaged in any unlawful activities (whether covered under the scope of the present GCC or not) subversive of the TPNODL's interest failing which appropriate action (legal or otherwise) may be taken against the Associate by the TPNODL, in accordance with the terms of the present GCC.

16.0 CONFIDENTIALITY

Associate and its employees or representatives thereof shall strictly maintain the confidentiality of various information they come across while executing the contract as detailed below.

16.1 Documents

All maps, plans, drawings, specifications, schemes and other documents or information related to the Contract/Project and the subject matter contained therein and all other information given to the Associate by the TPNODL in connection with the performance of the contract shall be held confidential by the Associate and shall remain the property of the TPNODL and shall not be used or disclosed to third parties by the Associate for any purpose other than for which they have been supplied or prepared. The Associate may disclose to third parties, upon execution of confidentiality agreements, such part of the drawings, specifications or information if such disclosure is necessary for the performance of the Work provided such third parties agree in writing to keep such information confidential to the same extent and degree as provided herein, for the benefit of the TPNODL.

16.2 Geographical Data

Maps, layouts and photographs of the unit/plant including its surrounding regions showing vital installation for national security of country or those of TPNODL shall not be published or disclosed to the third parties or taken out of the country without prior written approval of the TPNODL and upon execution of confidentiality agreements satisfactory to the TPNODL with such third parties prior to disclosure.

16.3 Associate's Processes

Title to secret processes if any developed by the Associate on an exclusive basis and employed in the design of the equipment shall remain with the Associate. TPNODL shall hold in confidence such processes and shall not disclose such processes to the third parties without prior approval of the Associate and execution by such third parties of secrecy agreements satisfactory to the Associate prior to disclosure. Upon completion of contract, such processes shall become the property of the TPNODL. Title to technical specifications, drawings, flow sheets, norms, calculations, diagrams, interpretations of test results, schematics, layouts and such other information, which the Associate has supplied to the TPNODL under the Contract shall be passed on to the TPNODL. The TPNODL shall have the right to use these for construction, erection, start-up, Trial Run, operation, maintenance, modifications and/or expansion of the works including for the manufacture of spare parts.

16.4 Exclusions

The provision of Clauses 16.1 to 16.3 shall not apply to information:

- Which at the time of disclosure are in the public domain which later on become part of public domain through no fault of the party concerned, or
- Which were in the possession of the party concerned prior to disclosure to him by the other party, or
- Which were received by the party concerned after the time of disclosure without restriction on disclosure or use, from a third party who did not acquire such information directly or indirectly from the other party or has no obligation of confidentiality for such information.

16.5 Violation

In case of violation of this clause, the Associate is liable to pay compensation and damages as may be determined by the competent authority of TPNODL.

17.0 INTELLECTUAL PROPERTY RIGHTS

If, in the course of performance of its functions and duties as envisaged by the scope of the present GCC, the Associate acquires or develops, any unique knowledge or information which would be covered, or, is likely to be covered within the definition of a trademark, copyright, patent, business secret, geographical indication or any other form of intellectual property right, it shall be obliged, under the terms of this present GCC, to share such knowledge or information with the TPNODL. All

rights, with respect to, or arising from such intellectual property, as afore mentioned, shall solely vest in TPNODL.

Moreover, the Associate undertakes not to breach any intellectual property right vesting in a third party/parties, whether by breach of statutory provision, passing off, or otherwise. In the event of any such breach, the Associate shall be wholly liable to compensate, indemnify or make good any loss suffered by such third party/parties, or any compensation/damages arising from any legal proceeding/s, or otherwise. No liability of TPNODL shall arise in this respect, and any costs, damages, expenses, compensation payable by TPNODL in this regard to a third party/parties, arising from a legal proceeding/s or otherwise, shall be recoverable from the Associate.

18.0 INDEMNITY

The Associate shall at all times indemnify, keep indemnified and hold harmless the TPNODL and its officers, directors, employees, affiliates, agents, successors and assigns against all actions, claims, demands, costs, charges and expenses arising from or incurred by reason of any infringement of patent, trade mark, registered design, copy rights and/or industrial property rights by manufacture, sale or use of the equipment supplied by the Associate whether or not the TPNODL is held liable for by any court judgments. In this connection, the TPNODL shall pass on all claims made against him to the Associate for settlement.

The Associate assumes responsibility for and shall indemnify and save harmless the TPNODL from all liability, claims, costs, expenses, taxes and assessments including penalties, punitive damages, attorney's fees and court costs which are or may be required to be paid by the TPNODL and its officers, directors, employees, affiliates, agents, successors and assigns arising from any breach of the Associate's obligations under the Contract or for which the Associate has assumed responsibilities under the Contract including those imposed under any local or national law or laws, or in respect to all salaries, wages or other compensation for all persons employed by the Associate or his Sub-Associates or suppliers in connection with the performance of any work covered by the Contract. The Associate shall execute, deliver and shall cause his Sub-Associate and suppliers to execute and deliver, such other further instruments and to comply with all the requirements of such laws and regulation as may be necessary there under to conform and effectuate the Contract and to protect the TPNODL.

The TPNODL shall not be held responsible for any accident or damages incurred or claims arising, due to the Associate's error there from prior to completion of work. The Associate shall be liable for such accidents and after completion of work for such accidents as the case may be due to negligence on his part to carry out Work in accordance with Indian laws and regulations and the specifications set forth herein.

19.0 LIABILITY & LIMITATIONS

19.1 Liability

Except for any specific liability which may be identified in the Contract and which may be payable hereunder, Associate shall not be liable for any special, incidental, indirect, or consequential Damages or any loss of business Contracts, revenues or other financial loss (or equivalents thereof no matter how claimed, computed or characterized) arising out of or in connection with the

Performance of the Work or supply of Goods ***unless caused by Associate's negligence, willful misconduct or breach of contract.***

If the Associate is a joint venture or consortium, all concerned parties shall be jointly and severally bound to the TPNODL for the fulfillment of the provisions of the Contract. The consortium or the joint venture shall designate one party as their leader, who will be the coordinator between the parties and TPNODL. The constituents & leader of the consortium or joint venture shall not be changed without the prior consent of TPNODL.

TPNODL shall have no liability or any special, incidental, indirect or consequential Damages for any loss of Business Contracts, revenues or other financial loss arising out of this Contract.

19.2 Limitation of Liability

The total liability of Associate against any contract shall be limited to the Total All Inclusive Contract Value.

20.0 FORCE MAJEURE

Force Majeure applies if the performance by either Party ("the Affected Party") of its obligations under Contract is materially and adversely affected.

"Force Majeure" shall mean any event or circumstance or combination of events or circumstances referred below and their consequences that wholly or partly prevents or unavoidably delays any Party in the performance of its obligations under this Agreement, but only and to the extent that such events and circumstances are not within the reasonable control, directly or indirectly, of the Affected Party and could not have been avoided even if the Affected Party had taken reasonable care:

- Act of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, embargo, blockade, revolution, riot, bombs, religious strife or civil commotion or terrorism, etc.
- Action or Act of Government or Governmental agency for which remedy is beyond the control of the affected parties. Any act of God.

Note: Causes like power breakdown/ shortages/fire/strikes, accidents etc do not fall under Force Majeure.

Time being the essence of the Contract, if either party is prevented from the performance of its obligations in whole or in part due to an event of Force Majeure, then provided Notice of happening of any event by the Affected Party is given to the other party within seven (7) days from the date of occurrence of such event, which DIRECTLY has impact on works and submitted details and quantum of resulting effect, but at the same time had made all possible efforts to mitigate and overcome effects thereof, the Affected Party's performance under this Contract shall be suspended until such event ceases and the Scheduled Completion shall be delayed accordingly.

If Force Majeure event(s) continue for a period of more than three months, the parties shall hold consultation to discuss the further course of action.

Neither party shall be considered to be in default or in breach of its obligation under the Contract to the extent that performance of such obligation by either party is prevented by any circumstances of Force Majeure which arise after effective date of Contract.

Neither party can claim any compensation from the other party on account of Force Majeure.

21.0 SUSPENSION OF CONTRACT

21.1 Suspension for Connivance

TPNODL may, at any time and at its sole option, suspend execution of all or any portions of the schedule of items of contract to be supplied/work to be executed by Associate under the contract by providing to the Associate at least two business days written notice for contracts having contract completion period less than sixty days and at least seven business days' notice for all other contracts.

Upon receipt of any such notice, the Associate shall respond as follows as applicable as per contract construction.

- Immediately discontinue further supply of material/goods specified in the suspension notice for supply contracts
- Immediately discontinue further service/work and supply of materials of those services/materials/work specified in the suspension notice for service /composite contract
- Promptly make every reasonable effort to obtain suspension, upon terms satisfactory to TPNODL, of all orders, outsourcing arrangements, and rental Contracts to the extent that they relate to performance of the portion of Work suspended by the notice.
- Protect and maintain the portion of the service/Work already completed, including the portion of the Work suspended hereunder, unless otherwise specifically stated in the notice.
- Continue delivering/carrying out the supply/service/work items as per contract conditions, which do not fall under purview of the suspension notice.

On receipt of resumption notice from TPNODL, the Associate shall resume execution of contract as specified in the resumption notice, within the time frame specified in the resumption notice.

21.2 Suspension for Breach of Contract conditions.

TPNODL shall suspend execution of whole/or part thereof the contract till such time Associate complies with the conditions stipulated under section clause 22.1 for breach/default of contract conditions.

21.3 Compensation in lieu of Suspension

If the suspension of the contract in whole or in part is for convenience of TPNODL and not due to any breach of contract conditions by the associate, TPNODL at its discretion shall consider compensating all reasonable additional costs incurred by Associate in lieu of suspension of whole or part of

contract, on representation of the Associate providing justified estimates of such additional costs and such estimates are found acceptable and approved by competent authority of TPNODL.

If the suspension of contract in whole or part thereof is due to breach of contract conditions (refer clause 22.1) by the Associate, Associate shall not be entitled for any compensation for any cost incurred in lieu of suspension of whole or part of contract and also shall be liable for compensating all the losses arising to TPNODL in lieu of suspension of contract. Resumption notice shall be subject to the Associate taking corrective action for the breach of contract conditions within the time frame and as per the terms specified in the suspension notice.

22 TERMINATION OF CONTRACT

22.1 Termination for Default/Breach of Contract

The contract / PO /RC shall be subject to termination by TPNODL in case of breach of the contract by the Associate which shall include but not be limited to the following:

- a. Withdrawal or intimation by the Associate of its intent to withdraw or surrender the execution / completion of the contracted work /PO or failure in ensuring adherence to any delivery schedules, in deviation of the contract/PO.
- b. Refusal or neglect on the part of the Associate to supply material/equipment of quantity or quality as specified by TPNODL and within the timeframe as specified in the contract document or refusal or neglect to execute the services/work in terms of the agreed standards of quantity or quality and/or within the timeframe specified in the contract/PO.
- c. Failure in any respect to perform any portion of the Work contracted with promptness, diligence, or in accordance with the terms of the contract.
- d. Failure to furnish guarantees as specified and /or failure to comply with the terms thereof.
- e. Failure to furnish such relevant documents or information within the time specified which may be necessary for due execution / completion of the works and documentation.
- f. Liquidation, bankruptcy either voluntary or involuntary OR entering into any composition or compromise with its creditors, or Insolvency.
- g. In case any reasonable information has been received by TPNODL that Associate has adopted/ or attempted to adopt any unethical conduct, action in award of the contract /PO or at any time thereafter.
- h. Failure to comply with applicable statutory provisions as contained in the contract or failure to comply with the applicable laws.
- i. Failure to comply with safety regulations/clauses stipulated in the contract or as may be generally instructed by TPNODL.

If the default or breach as specified under clause 22 (except sub clause g thereof) be committed by the associate for the first time, TPNODL shall issue, along the with notice of default or breach, a

warning notice instructing the associate to take remedial/corrective action within the time frame stipulated in the warning notice and not to repeat the same in future. The timeframe for corrective action by the associate shall be specific to the nature of breach of contract and the same shall not be objected to by the Associate. If the Associate fails to comply with the instructions in the warning notice or in taking corrective action to the satisfaction of TPNODL then TPNODL may terminate the entire or part of contract at its discretion by issuing termination notice without incurring any liability on this ground.

In case the contract is terminated for any breach of the nature specified in clause 22 g stated above, TPNODL shall have the right to terminate all the contracts TPNODL is having with the Associate by issuing termination notice which shall be without prejudice to the other rights of TPNODL available to it under law.

Without prejudice to its right to terminate for breach of contract, TPNODL may, without assigning any reason, terminate the Contract in whole or in part at any time at its discretion while the contract is in force by serving a written notice of two weeks to the Associate.

In the event of TPNODL having preceded with termination of the contract the associate shall comply and proceed further in the following manner:

- a) Associate shall discontinue the supply, on the expiry of the said period of two weeks.
- b) Associate shall ensure that no further steps are being taken towards discharge of the obligations, terms and conditions as contained in the contract/PO. This shall include initiation of actions not limited to discontinuation of other allied and associated arrangements which the associate might have entered into with third parties for due discharge of its obligations under the contract with TPNODL.
- c) The Associate shall perform thereafter such tasks as may be necessary to preserve and protect the terminated portion of the material/service/work in progress and the materials and equipment at TPNODL sites or in transit thereto. However the associate shall continue to fulfill its contractual obligations with regard to the part of contract not terminated.
- d) It shall be open for TPNODL to conduct a joint assessment with the associate of the material, supplies, equipment, works or in general as to the subject matter of the contract in regard to which the associate claims having completed its obligations before or during such termination.
- e) It shall be open to TPNODL to seek invocation of the performance bank guarantee or any other guarantee or other security deposit by whatever name called submitted by the associate, which shall not be objected to or protested against by the associate.

In case of termination of the contract the parties agree to be governed inter alia by the following:

- a) In case TPNODL exercises its right of termination as stated above the associate shall not dispute or object to the same.

- b) The Associate shall be entitled to receive and claim only such payments OR sums of money from TPNODL as may be found payable to it in regard to works executed by it under the terms of the contract and no other claim of any nature whatsoever shall be made by the Associate.
- c) All such provisions which the parties have agreed to survive and prevail even after termination of the contract shall remain effective despite the termination.

In the event of such termination, TPNODL may finish the Work by whatever method it may deem expedient, including the hiring of services and /or purchase of material equipment from such third parties as TPNODL may deem fit or may itself provide any labor or materials and perform any part of the Work. The associate undertakes to bear the incremental costs if any paid by TPNODL in such a case attributable to failure on the part of the associate. The Associate in such a case shall not be entitled to receive any further payments and any sums found payable to it may be adjusted by TPNODL against the amount recoverable from him on this ground. The same shall be without prejudice to other rights available to TPNODL under law against the associate.

Upon the termination of any of the contract due to occurrence of any circumstances provided in clauses stated above and constituting repeated breach or misconduct, TPNODL shall be entitled to bar the associates its agents, affiliates from undertaking any negotiation / tendering, bidding, participation activities concerning TPNODL for a period of two years from date of such termination. The same shall be without prejudice to other rights available to TPNODL.

22.2 Termination for Convenience of Associate

Associate at its convenience may request for termination of contract, clearly assigning the reason for such request. TPNODL has full right to accept, reject or partially accept such request. However, associate shall continue its supply as per contract till final approval is given to associates for such termination.

22.3 Termination for Convenience of TPNODL

TPNODL at its sole discretion may terminate the contract by giving 30 days prior notice in writing or through email to the Associate. TPNODL shall pay the Associate for all the supplies/ services rendered till the actual date of contract termination against submission of invoice by the Associate to that effect.

23.0 DISPUTE RESOLUTION & ARBITRATION

In case of any dispute or difference the parties shall endeavor to resolve the same through conciliatory and amicable measures within 15 Days failing which the matter may be referred by either party for resolution by the sole arbitrator to be appointed mutually by both the parties. The arbitral proceedings shall be conducted in accordance with Arbitration and Conciliation Act 1996 and the place of arbitration shall be Balasore. The language to be used at proceedings shall be English and the award of the arbitrator shall be final and binding on the parties. The parties shall bear their respective costs of arbitration. The associate shall continue to discharge its obligations towards due performance of the works as per the terms of the contract during the arbitration proceedings unless

otherwise directed in writing by TPNODL or suspended by the arbitrator. Further, TPNODL shall continue making such payments as may be found due and payable to the associate for such works.

23.1 Governing Laws and Jurisdiction

The parties shall be subject to the jurisdiction of the courts of law in Balasore & the writ jurisdiction of Hon'ble High Court of Odisha at Cuttack and any matter arising here from shall be subject to applicable law in force in India.

24.0 ATTRIBUTES OF GCC

24.1 Cancellation

The Company reserves the right to cancel, add, delete at its sole discretion, all or any terms of this GCC or any contract, order or terms agreed between the parties in pursuance without assigning any reasons and without any compensation to the Associates.

24.2 Severability

If any portion of this GCC is held to be void, invalid, or otherwise unenforceable, in whole or part, the remaining portions of this GCC shall remain in effect.

24.3 Order of Priority

In case of any discrepancies between the stipulations in General Conditions of the Contract (GCC) and Special Conditions of Contract (SCC), the GCC shall stand superseded by the SCC to the extent stipulated hereinabove while balance portion of respective clauses of GCC shall continue to be applicable.

25.0 ERRORS AND OMISSIONS

The Associate shall be responsible for all discrepancies, errors and omissions in the drawings, documents or other information submitted by him, irrespective of whether these have been approved, reviewed or otherwise accepted by the TPNODL or not. However any error in design/drawing arising out of any incorrect data/written information from TPNODL will not be considered as error and omissions on part of the Associate.

26.0 TRANSFER OF TITLES

The title of ownership and property to all equipment, materials, drawings & documents shall pass to the TPNODL on acceptance of material by store/site after inspection.

However, such passing of title of ownership and property to the TPNODL shall not in any way absolve, dilute or diminish the responsibility and obligations of the Associate under this Contract including loss or damages and all risks, which shall vest with the Associate.

27.0 INSURANCE

The Associate shall take out the Insurance Policies which shall cover all risks including the following, as applicable:-

- a) The value of the policy shall cover the total value of all the items till they are handed over to TPNODL.
- b) TPNODL shall be the principal holder of the policy. The Associate shall be the loss payee under the policy. Associate / Sub-contractor of the Associate shall not be holders or beneficiaries in the policy nor shall they be named in the policy. TPNODL reserves the exclusive right to assign the policy.
- c) While the payment of premium may be phased in agreement with the insurance company, at no time shall goods and services required to be provided by the associate shall remain uninsured in accordance with (a) above.
- d) A copy of the Insurance policy shall be made available to TPNODL prior to first dispatch lot of any Equipment and policy shall be kept alive and valid at all times up to the stage of final acceptance.
- e) TPNODL reserves the right to take out whatever policy that is deemed necessary by him if the associate fails to keep the said policy alive and valid at all times and/or causes lapses in payment of premium thereby jeopardizing the said policy. The cost of such policy(s) shall be recovered / deducted from the amount payable to the associate.
- f) The policy shall ensure that the TPNODL's decision regarding replacement of goods damaged, lost or rendered unusable shall be final.

In all cases, the associate shall lodge the claims with the underwriters and also settle the claims and shall also notify TPNODL of any filed claims. However, the associate shall proceed with the repairs and/or replacement of the equipment/components without waiting for the settlement of the claims. In case of seizure of materials by concerned authorities, the associate shall arrange prompt release against bond, security or cash as required. TPNODL, upon request by the associate, will extend all reasonable assistance to the associate in such a case.

All the insurance claims shall be processed and settled by the associate and the missing/damaged items shall be replaced / repaired by them without any extra cost to TPNODL and without affecting the completion time.

28.0 SUGGESTIONS & FEEDBACK

We welcome all our Business Associates to write to us about their experience with TPNODL; be it our Company, our services or our people. Each and every concern, issue, query and suggestion from you will help us to become a better company to work with and shall help us develop a strong bonding of trust and a long term relationship with you.

You may send your feedback by filling up our Business Associate Feedback Form enclosed herewith as *Annexure-I*. You can also provide your feedback to E-Mail at sunil.bhattar@tpnodl.com

- Suggestions for us
- Feedback form
- Knowledge Sharing/ Experience with TPNODL
- Any issues with TPNODL.

Submission of feedback form is mandatory before the release of final payment to the BA.

29.0 CONTACT POINTS

In case Business Associate needs information with respect to payments or has any grievances, same may be E-Mail to nirmal.das@tpnodl.com & jitendra.mishra@tpnodl.com

30.0 LIST OF ANNEXURES

S. No.	Subject	Annexure
1.	Performa for Bid Security Bank Guarantee	A
2.	Performa for Performance Bank Guarantee (CP cum EP)	B
3.	Performa for No Demand Certificate by Associate	C
4.	Performa For Application For Issuance of Consolidated TDS Certificate	D
5.	Business Associate Feedback Form	E
6.	Acceptance Form For Participation In Reverse Auction Event	F
7.	Form for RTGS Payment	G
8.	Vendor Appraisal Form	H
9.	Manufacturer Authorization Form	I
10.	Tata Code of Conduct	I



NIT No.: TPNODL/OT/2021-22/041 Dtd.22.07.2021

ANNEXURE-A

PROFORMA FOR BID SECURITY BANK GUARANTEE

**TP Northern Odisha Distribution Ltd
Balasore, Odisha**

WHEREAS, (Name of the Bidder) _____
(hereinafter called "the BIDDER") has submitted his bid dated _____ for the (Tender No. &
Name of Contract) _____ (hereinafter called "the BID").

KNOW ALL men by these presents we (Name of the Bank) _____
of (Name of the Country) _____ having our registered office at _____
(hereinafter called "the BANK) are bound unto TP Northern Odisha Distribution Ltd (TPNODL) in the
sum of _____ for which payment well and truly to be made to the TPNODL the
Bank binds himself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _____ day of _____ 20_____.

The CONDITIONS of this obligation are:

- i) If the Bidder withdraws his Bid during the period of bid validity specified in the Proforma of Bid or
- ii) If the Bidder having been notified of the acceptance of his Bid by the TPNODL during the period of bid validity fails or refuses to furnish the Contract Performance Bank Guarantee, in accordance with the Instructions to Bidders.

We undertake to pay the TPNODL up to the above amount upon receipt of its first written demand, provided that in its demand the TPNODL will note that amount claimed by it is due to it owing to the occurrence of one or both conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date (No of days as mentioned in tender enquiry) days after the closing date of submission of bids as stated in the Invitation to Bid or as extended by you at any time prior to this date, notice of which extension to the Bank being hereby waived, and any demand in respect thereof should reach the Bank not later than the above date.

DATE	SIGNATURE OF THE BANK
WITNESS	SEAL

(Signature, Name & Address) (At least 2 witnesses)

ANNEXURE- B

PROFORMA FOR PERFORMANCE BANK GUARANTEE (CP cum EP)

(On Rs.100/- Stamp Paper) Note:

- a) Format shall be followed in to
- b) Claim period of one month must be kept up
- c) The guarantee to be accompanied by the covering letter from the bank confirming the signature to the guarantee

**TP Northern Odisha Distribution Ltd
Balasore, Odisha**

CP cum EP BG No.....

Order/Contract No.....dated.....

1. You have entered into a Contract No _____ with M/s. _____
(hereinafter referred to as "the Vendor") for the supply cum erection / civil work of _____
(hereinafter referred to as "the said Equipment") for the price and on the terms and conditions contained in the said contract.
2. In accordance with the terms of the said contract, "the Vendor" agreed to furnish you with an irrevocable, unconditional and acceptable bank guarantee for 10% of the value of contract and to be valid till the end of Guarantee period plus one month towards "Contract cum Equipment performance". For this purpose you have agreed to accept the guarantee.
3. In consideration thereof, we, _____ hereby irrevocably and unconditionally guarantee to pay to you on demand but in any case before the end of five working days from the date of the claim and without demur and without reference to "the Vendor" such amount or amounts not exceeding the sum of
Rs. _____ (Rupees _____ only) being _____%
(_____ percent) of the total value of the contract on receipt of your intimating that "the Vendor" has not fulfilled his contractual obligations. You shall be the sole judge for such non-fulfillment and "the Vendor" shall have no right to question such judgment.
4. You shall have the right to file / make your claim on us under the guarantee for a **further period of one month** from the date of expiry.
5. This guarantee shall not be revoked without express consent and shall not be affected by your granting time or any other indulgence to "the Vendor", which shall include but not be limited to, postponement from time to time of the exercise the same in you or any right which you may have against "the Vendor" and to exercise the same in any covenant contained or implied in the said contract or any other course or remedy or security available to you, and our Bank shall not be released from its obligations under this guarantee.

6. We also agree that you shall be entitled at your option to enforce this guarantee against our bank as a principal debtor, in the first instance, notwithstanding any other security or guarantee that you may have in relation to “the Vendor’s” liabilities in respect of the premises
7. This guarantee shall not be affected by any change in the constitution of our Bank or “the Vendor” or for any other reason whatsoever.
8. Any claim / extension under the guarantee can be lodge-able at outstation banks or at Balasore branch and claim will also be payable at Balasore Branch (to be confirmed by Balasore Branch by a letter to that effect in case BG is from the branch outside Balasore).
9. Notwithstanding anything herein contained, our liability under this guarantee is limited to Rs. _____ (Rupees _____) only and the guarantee will remain in force upto and including _____ (Date) and shall be extended from time to time for such period or period as may be desired by “the Vendor”.
10. Unless a demand or claim under this guarantee is received by us in writing within one months from _____ (expiry date) i.e. on or before _____ (claim period end date), we shall be discharged from all liabilities under this guarantee thereafter.

Dated at _____ this _____ day of _____ 20__

Bank’s rubber stamp

1. Banks full address

Designation of Signatory

2. Bank official number

ANNEXURE-C

PROFORMA FOR “NO DEMAND CERTIFICATE” BY ASSOCIATE

(On Company’s Letter head or with Company Seal)

(To be submitted by the Associate to TPNODL Accounts Department at the time of receipt of full and final payment)

(Certificate No. CCP/002)

Name of the Project

Order/ Contract No.

Dated

Name of the Associate

Scheme No. / Job No.

We, M/s. _____ (Associate) do hereby acknowledge and confirm that we have received the full and final payment due and payable to us from TPNODL, in respect of our aforesaid Order No _____ dated _____ including amendments, if any, issued by TPNODL to our entire satisfaction and we further confirm that we have no claim whatsoever pending with TPNODL under the said contract / W.O.

Notwithstanding any protest recorded by us in any correspondence, documents, measurement books and / or final bills etc., we waive all our rights to lodge any claim or protest in future under this contract.

We are issuing this “NO DEMAND CERTIFICATE” in favour of TPNODL, with full knowledge and with our free consent without any undue influence, misrepresentation, coercion etc.

Place

Name

(Company Seal)

ANNEXURE-D

PROFORMA FOR APPLICATION FOR ISSUANCE OF CONSOLIDATED TDS CERTIFICATE

To be printed on the letterhead

To,
TP Northern Odisha Distribution Ltd
Balasore, Odisha

Sub: Application for issuance of Consolidated TDS Certificate for the FY _____

Dear Sir,

I / we hereby request / authorize you to issue me / us a consolidate TDS Certificate for the financial year _____ against tax deducted at source by you from my / our payments / bills during the said year from time to time under Chapter XVII – B of the Income Tax Act, 1961. For and on behalf of

Signature

Name

Address

Contact No. (Land Line)

(Mobile)

PAN #

Assessing authority

ATTACH THE COPY OF PAN CARD

ANNEXURE-E

BUSINESS ASSOCIATE FEEDBACK FORM

With an objective to improve our internal processes and systems, and serve you better, we solicit your valuable feedback & suggestions. It is estimated that it will take about 10 minutes to complete this survey. We assure you that your feedback shall be kept confidential. Please send the duly filled feedback form in the "TPNODL addressed - attached envelop"

You are associated with us as

OEMs		Service Contractor		Material Contractor		Material & Manpower Supplier	
------	--	--------------------	--	---------------------	--	------------------------------	--

You are associated with us for

Less than 1 Year		More than 1 Year but less than 3 Years		More than 3 years	
------------------	--	--	--	-------------------	--

Your office is located at

Balasure		Within 200 Kms from Balasure		More than 200 Kms from Balasure	
----------	--	------------------------------	--	---------------------------------	--

Your nearly turnover with TPNODL

Less than 25 Lacs		25 Lacs to 1 Crore		More than 1 Crore	
-------------------	--	--------------------	--	-------------------	--

Additional Information

Your Name	
Your Designation	
Your Organization	
Contact Nos.	
Email	

SECTION – A

(Please ✓ mark in the relevant box and give your remarks / suggestions / information for our improvement).

S. No.	Parameters	1	2	3	4	5	Remarks/ Suggestion
		Do Not Agree	Slightly in Agreement	Fair Agreement	Mostly in Agreement	Fully Agree	
1	You receive all relevant queries / tenders from us in timely manner.						
2	We provide you enough lead time to respond to our queries / tenders.						
3	We provide you adequate support (drawings, documents, clarifications, briefing etc.) to enable you meet our requirements.						
4	All following elements of our contract / purchase order are rational :						
4.1	Scope of Work						
4.2	Delivery / Execution Schedule						
4.3	Payment Terms						
4.4	Liquidated Damages						
4.5	Performance Guarantee						
5	Our purchase orders / contracts are simple, specific & easy to understand						
6	TPNODL demonstrate willingness to be flexible in administration of Contract / Purchase Order						
7	We provide timely responses / clarifications to your queries						
8	TPNODL representative you interact / coordinate with is adequately empowered to support you in meeting contractual obligations						
9	TPNODL provide you all necessary infrastructure support for timely and quality completion of work (including AMC)						
10	TPNODL Engineer-in-Charge timely certifies the jobs executed/ material supplied						
11	TPNODL Engineer-in-Charge efficiently supervises the job execution for timely completion of job						

S. No.	Parameters	1	2	3	4	5	Remarks/ Suggestion
		Do Not Agree	Slightly in Agreement	In Fair Agreement	Mostly in Agreement	Fully Agree	
12	Are you satisfied with the overall payment release mechanism of TPNODL						
13	Our approach for Inspection and Quality Assurance effective to expedite project completion?						
14	TPNODL never defaults on contractual terms						
15	In TPNODL Contracts closure is done within set time limit						
16	Our material receiving procedures are well defined and efficiently deployed to reduce mutual inconvenience						
17	Bank Guarantees are released in time bound manner						
18	Our processes related to payment / account settlement are effective.						
19	You get payments on time						
20	TPNODL Employees follow Ethical behavior						

SECTION – B

(Please rate the following parameters on a scale of 1 to 5, where 1 - Minimum; 5 - Maximum)

S. No.	Parameters	1	2	3	4	5	Remarks/ Suggestion
1	How do you rate courtesy/ empathy/ attitude level and warmth of TPNODL employees you interact with from following team?						
1.1	Project Engineering						
1.2	Division / Sub-division						
1.3	Projects						
1.4	Inspection & Quality Assurance						
1.5	Stores						
1.6	Metering & Billing						
1.7	Accounts / Finance						
1.8	Administration						
1.9	IT & Automation						
2	How would you rate TPNODL in comparison to your other clients in terms of fairness of treatment and transparency with its Business Associates?						
3	How would you rate TPNODL in comparison to your other clients in terms of processes and systems to manage partnership with its Business Associates						
4	How would you rate TPNODL in comparison to your other clients in terms of building long term & mutually relationship with its Business Associates						

SECTION – C

Please ✓ mark in the relevant box and give your remarks / suggestions / information for our improvement.

S. No.	Parameters	Certainly No	Probably No	Certainly Yes	Probably Yes	Remarks/ Suggestion
1	Based on your experience with TPNODL, would you like to continue your relationship with TPNODL?					
2	If someone asks you about TPNODL, would you talk “positively” about TPNODL?					
3	Would you refer TPNODL name to others in your community, fraternity and society as a professional & dynamic organization?					

SECTION - D

If we ask you to rate us on a scale of 1 to 10, how will you rate TPNODL, that truly represents your overall satisfaction with us (please tick appropriate box) -

1	2	3	4	5	6	7	8	9	10
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SECTION – E

Please ✓ mark in the relevant box and give your remarks / suggestions / information for our improvement.

Please spare your thoughts for TPNODL's improvement in particular areas of weaknesses, particularly relating to some great practices, attitudes that you have seen elsewhere in Indian and International Organizations, which you recommend TPNODL to adopt. Please give your valuable salient recommendations.

Please spare your thoughts for TPNODL's improvement in particular areas of major concerns for you. We also welcome your suggestions to adopt any best practices, altitudes that you

Recommendation	<i>Please tick (✓) your top 5 expectations out of the following 10 points listed below -</i>	
(Please list down improvement you expect from TPNODL)	<i>Timely payment</i>	
1	<i>Flexibility in Contracts/PO</i>	
	<i>Clarity in PO,s & Contracts</i>	
2	<i>Timely response to quarries</i>	
	<i>Timely certification of works executed</i>	
3	<i>Clarity in Specs, drawings, other docs etc.</i>	
	<i>Adequate information provided on website for tender notification, parties qualified etc.</i>	
4	<i>Timely receipt of material at site for execution</i>	
	<i>Performance Guarantee/EMD released in time</i>	
5	<i>Inspection & quality assurance support for timely job completion</i>	

We thank you for your time and courtesy!!

ANNEXURE-F

ACCEPTANCE FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT

(To be signed and stamped by the bidder prior to participation in the auction event)

In a bid to make our entire procurement process more fair and transparent, TPNODL intends to use the reverse auctions through online mechanism (Ariba) 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. TPNODL 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. TPNODL will make every effort to make the bid process transparent. However, the award decision by TPNODL would be final and binding on the supplier.
3. The bidder agrees to non-disclosure of trade information regarding the purchase, identity of TPNODL, 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 TPNODL.
6. In case of intranet medium, TPNODL shall provide the infrastructure to bidders. Further, TPNODL 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 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 TPNODL.
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 TPNODL 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 the auction event shall be considered by TPNODL.

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



NIT No.: TPNODL/OT/2021-22/041 Dtd.22.07.2021

ANNEXURE-G

To,
Drawing & Disbursing Officer,
TP Northern Odisha Distribution Ltd
Balasore, Odisha

Sub: e-Payments through National Electronic Fund Transfer (NEFT) OR Real Time Gross Settlement System (RTGS)

Dear Sir,

We request and authorize you to affect e-payment through NEFT/RTGS to our Bank Account as per the details given below:-

Vendor Code :

Title of Account in the Bank :

Account Type :

(Please mention here whether account is Savings/Current/Cash Credit)

Bank Account Number :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Name & Address of Bank :

Bank Contact Person's Names :

Bank Tele Numbers with STD Code :

Bank Branch MICR Code :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(Please enclose a Xerox a copy of a cheque.
This cheque should not be a payable at par
cheque)

Bank Branch IFSC Code :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(You can obtain this from branch where you
have your account)

Email Address of accounts person: (to :

send payment information)

Name of the Authorized Signatory: :

Contact Person's Name: :

Official Correspondence Address: :

We confirm that we will bear the charges, if any, levied by our bank for the credit of NEFT/RTGS amounts in our account. Any change in above furnished information shall be informed to TPNODL well in time at our own. Further, we kept TPNODL indemnified for any loss incurred due to wrong furnishing of above information.

Thanking you,

For _____

(Authorised Signatory)

(Signature with Rubber Stamp)

Certification from Bank:

We confirm that we are enabled for receiving NEFT/RTGS credits and we further confirm that the account number (specify Bank a/c no.) of (Please mention here name of the account holder), the signature of the authorised signatory and the MICR and IFSC Code of our branch mentioned above are correct.

This also is certified that the above information is correct as per Bank record

(Manager's/ Officers Signature under Bank Stamp)

ANNEXURE-H

VENDOR APPRAISAL FORM

TO BE SUBMITTED BY VENDOR (To be filled as applicable)		
Part A		
1.0	DETAILS OF THE FIRM	
	1.1	NAME (IN CAPITAL LETTERS)
	1.2	TYPE OF CONCERN (PROPRIETARY) PARTNERSHIP PVT.LTD., PUBLIC LTD. ETC.
	1.3	YEAR OF ESTABLISHMENT
	1.4	LOCATION OF OFFICE POSTAL ADDRESS
	1.5	CONTACT DETAIL OF BA's REPRESENTATIVE NAME E-MAIL ID CELL NO.
	1.6	LOCATION OF MANUFACTURING UNITS :
		i) UNITS 1 :
		ii) OTHER UNITS :
2.0	PRODUCTS / SERVICES BEING OFFERED :	
3.0	TURNOVER DURING THE LAST 3 YEARS (TO BE VERIFIED WITH THE LATEST PROFIT & LOSS STATEMENT). :	
4.0	AVALABILITY OF STATUTORY DOCUMENTS I.E. COPY OF PAN CARD :	
5.0	AVALABILITY OF STATUTORY DOCUMENTS I.E. COPY OF GST REGISTRATION ÷	
6.0	BA BELONGS TO AA COMMUNITY (SC/ST) ÷	
7.0	DOCUMENTS VERIFYING ADDRESS PROOF (SUPPORTED BY ANY GOVT. ISSUED DOCUMENT) ÷	
8.0	TECHNICAL	
	8.1	NO.OF DESIGN ENGINEERS (INDICATE NO.OF YEARS EXPERIENCE IN RELATED FIELDS) :
	8.2	NO.OF DRAUGHTSMEN :
	8.3	COLLABORATION DETAILS (IF ANY) :
		8.3.1 DATE OF COLLABORATION :
		8.3.2 NAME OF COLLABORATOR :
		8.3.3 RBI APPROVAL DETAILS :
		8.3.4 EXPERIENCE LIST OF COLLABORATOR :

		8.3.5 DURATION OF AGREEMENT	:
	8.4	AVAILABILITY OF STANDARDS / DESIGN PROCEDURES / COLLABORATOR'S / DOCUMENTS (CHECK WHETHER THESE ARE LATEST/CURRENT	:
	8.5	TECHNICAL SUPPORT, BACK-UP GUARANTEE, SUPERVISION, QUALITY CONTROL BY COLLABORATOR (WHEREVER ESSENTIAL). (THIS CLAUSE IS RELEVANT WHEN VENDOR'S EXPERIENCE IS INADEQUATE)	:
	8.6	QUALITY OF DRAWINGS	:
9.0	MANUFACTURE		
	9.1	SHOP SPACE, LAYOUT LIGHTING, VENTILATION, ETC.	:
	9.2	POWER (KVA)	:
		MAINS INSTALLED	:
		UTILISED	:
		STANDBY POWER SOURCE	:
	9.3	MANUFACTURING FACILITIES (ATTACH LIST OF EQUIPMENTS AS APPLICABLE)	:
		10.3.1 MATERIAL HANDLING	:
		10.3.2 MACHINING	:
		10.3.3 FABRICATION	:
		10.3.4 HEAT TREATMENT	:
		10.3.5 BALANCING FACILITY	:
		10.3.6 SURFACE TREATMENT PRIOR TO PAINTING/ COATING, POLISHING, PICKLING, PASSIVATION, PAINTING, ETC.	:
	9.4	SUPERVISORY STAFF	:
	9.5	ADEQUACY OF SKILLED LABOURS (MACHINISTS, WELDERS, ETC.)	:
	9.6	NO. OF SHIFTS	:
	9.7	TYPE OF MATERIAL HANDLED (SUCH AS CS, SS, ETC.)	:
	9.8	WORKMANSHIP	:
	9.9	MATERIAL IN STOCK AND VALUE	:
	9.10	TRANSPORT FACILITIES	:
	9.11	CARE IN HANDLING	:
10.0	INSPECTION / QC / QA / TESTING		
	10.1	NUMBER OF PERSONNEL (INDICATE NO.OF YEARS OF EXPERIENCE)	:
	10.2	INDEPENDENCE FROM PRODUCTION	:
	10.3	AVAILABILITY OF PROCEDURAL WRITE UP/QUALITY PLAN	:
	10.4	INCOMING MATERIAL CONTROL AND DOCUMENTATION	:

10.5	RELIABILITY/REPUTATION OF SUPPLY SOURCES	:
10.6	STAGE INSPECTION AND DOCUMENTATION	:
10.7	SUB-ASSEMBLY & DOCUMENTATION	:
10.8	FINAL INSPECTION AND DOCUMENTATION	:
10.9	PREPARATION OF FINAL DOCUMENTATION PACKAGE	:
10.10	TYPE TEST FACILITIES	:
10.11	ACCEPTANCE TEST FACILITIES	:
10.12	CALIBRATION OF INSTRUMENTS AND GAUGES (WITH TRACEABILITY TO NATIONAL STANDARDS) (ATTACH LIST)	:
10.13	STATUTORY APPROVALS LIKE BIS, IBR, ETC.(AS APPLICABLE)	:
10.14	SUB-VENDOR APPROVAL SYSTEM AND QUALITY CONTROL	:
10.15	DETAILS OF TESTS CARRIED OUT AT INDEPENDENT RECOGNISED LABORATORIES	:
	i) FURNISH LIST OF TESTS CARRIED OUT AND THE NAME OF THE LABORATORY WHERE THE TESTS WERE CONDUCTED	:
	ii) CHECK AVAILABILITY OF CERTIFICATES AND REVIEW THESE WHEREVER POSSIBLE	:
11.0	EXPERIENCE (INCLUDING CONSTRUCTION / ERECTION / COMMISSIONING) TO BE FURNISHED IN THE FORMAT INDICATED IN APPENDIX)	:
12.0	SALES, SERVICE AND SITE ORGANISATIONAL DETAILS	:
13.0	CERTIFICATE FROM CUSTOMERS (ATTACH COPIES OF DOCUMENTS)	:
14.0	POWER SITUATION	:
15.0	LABOUR SITUATION	:
16.0	APPLICABILITY OF SC/ST RELAXATION (Y/N) IF YES, SUPPORTING DOCUMENTS TO BE ATTACHED	
Part C Supporting Documents		

18.0	<p>DOCUMENTS TO BE ENCLOSED:</p> <ol style="list-style-type: none"> 1. Factory License 2. ISO Certificate 3. Registration of Central Excise 4. Income Tax Clearance. 5. PF Registration 6. ESI Registration 7. Insurance for Workman Compensation Act No. 8. Electrical Contract LIC No. 9. PAN No. 10. GST Registration 11. WC Tax Registration 12. Organogram of Co. having organogram of Design, safety, quality, production and other teams. 13. Details of subscription of BIS, IEC, IEE, ASTM or other. 14. Details of the team in Design, Quality, Safety, Production. 15. List of manufacturing equipment as per Part C. 16. List of calibrated equipment as per Part C. 17. List of clients and order executed in past two years. 18. Complaint escalation matrix. 19. Performance Certificates of same product from Minimum two utilities. 20. e-Payment Form as per enclosed Annexure-G 	
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*** Classification of BA s under SC/ST shall be governed under following guidelines:**

- **Proprietorship/ Single Ownership Firm:** Proprietor of the firm should be from SC/ST community. Governing document shall be Proprietorship Deed.
- **Partnership Firm:** Only such firms shall qualify which have SC/ST partners holding equal to or more than 50% of the total ownership pattern of the firm. Governing document shall be Partnership Deed.
- **Private Limited Company:** Only such firms shall qualify which have SC/ST directors holding equal to or more than 50% of the total ownership pattern of the firm. Governing document shall be Memorandum of Understanding (MoU) and/or Article of Association (AoA).
- The relaxation available for BAs under SC / STs shall be as per GCC for Tender Fees, EMD, PBG and Turnover criteria.

NOTE: Certification from SC/ST Commission shall be required for deciding upon SC/ST status of a person.

Annexure-G (e-Payment detail form) must be filled by Associate along with this form.



NIT No.: TPNODL/OT/2021-22/041 Dtd.22.07.2021

ANNEXURE-I

MANUFACTURER AUTHORIZATION FORM

(To be submitted on OEM's Letter Head)

Date:

Tender Enquiry No.:

To,
General Manager (Contracts)
TP Northern Odisha Distribution Ltd,
Balasore, Odisha

Sir,

WHEREAS M/s. [name of OEM], who are official manufacturers of having factories at [address of OEM] do hereby authorize M/s [name of bidder] 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 the Special Conditions of Contract or as mentioned elsewhere in the Tender Document, with respect to the Goods offered by the above firm in reply to this Invitation for Bids.

We hereby confirm that in case, the channel partner fails to provide the necessary services as per the Tender Document referred above, M/s [name of OEM] shall provide standard warranty on the materials supplied against the contract. The warranty period and inclusion / exclusion of parts in the warranty shall remain same as defined in the contract issued to their channel partner against this tender enquiry.

Yours Sincerely,

For

Authorized Signatory

Annexure-J

TATA CODE OF CONDUCT (TCoC)

Introducing Tata Code of Conduct (TCoC) in GCC, the following clause is proposed for inclusion as per suggestions from Chief Ethics Counsellor -

“TCoC is the overarching policy framework that applies to all TATA Group companies including TPNODL. TCoC provides for stakeholder-wise approach in each of the seven chapters.

The chapter “Our Value Chain Partners” states the policy as follows:

1. We shall select our suppliers and service providers fairly and transparently.
2. 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.
3. 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.
4. 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.
5. We respect our obligations on the use of third party intellectual property and data.

To effectively implement TCoC, there shall be a 3-tier framework comprising of Ethics Management Apex Team headed by the CEO, who is also the Principal Ethics Officer (PEO), TPNODL; Locational Ethics Counsellors (LECs) who cover various locations/offices of TPNODL; and LECs are assisted by 4-5 Ethics Champions (ECs).

In case any Ethical Concern is faced during the course of your business dealings with TPNODL, one may e mail at: ceooffice@tpnodl.com

TPNODL is committed to follow Core Values and Core Principles mentioned in TCoC, cited below, in carrying out various activities as well as in discharge of bi-lateral and multi-lateral obligations involving other entities/organizations:

Core Values:

All six core values are already mentioned in GCC.

Core Principles:

1. **Zero tolerance to bribery or corruption** in any form.
2. Committed to **good corporate citizenship**
3. Contribute to the **economic development of the communities** of the countries & regions we operate in.
4. No compromise on **Safety**
5. Our conduct shall be **fair & transparent**

6. Respect the **human rights & dignity** of our stakeholders
7. **No unfair discrimination** of any kind
8. Statements made to stakeholders shall be **truthful** & made in **good faith**
9. Not engage in any restrictive or **unfair trade practice**
10. Provide avenues for our stakeholders to **raise concerns in good faith**
11. Environment **free from fear** of retribution to deal with concerns that are raised
12. Expect the leaders to be **role model**
13. **Comply with the laws** of the countries in which we operate

Gift Policy:

Principles for acceptance of gifts/benefits –

A gift or benefit may be accepted only if it complies with all of the following principles:

- ✓ it does not influence,
- ✓ does not have the potential to influence, an employee in such a way as to compromise or appear to compromise integrity and impartiality
- ✓ does not create a conflict of interest or perception of conflict of interest;

Principles for non-acceptance of gifts/benefits -

The gift or benefit may not be accepted or given if any of the following principles apply:

- ✓ causes the recipient or donor **to act in partial manner** in the course of duty
- ✓ apprehension of the recipient becoming **obligated to the donor**
- ✓ it is **not offered openly**
- ✓ if is an **offer of money** or something readily convertible to money (e.g. Shares)

Violation –

1. Not abiding with this policy would constitute violation of “Our Employees” Stakeholder group Clause “Gifts and Hospitality” of the Tata Code of Conduct (TCoC) 2015. Prompt action will be taken against violations.
2. Any deviation from this policy must be supported by appropriate rationale and must be duly approved by CEO who is also the Principal Ethics Officer. In any case, in dealing with such deviations, the spirit of the TCoC should in no case be compromised.
3. If it is determined that an employee / associate has violated this policy, appropriate action including termination of the employee’s / associate’s employment or association with TPNODL may be decided upon.

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3.15/5/8/10 MVA Power Transformers

1. SCOPE

- 1.1** This specification provides for design, engineering, manufacture, assembly, stage inspection, final inspection and testing before dispatch, packing and delivery at destination stores by road transport, transit insurance of 3.15/5/8/10 MVA, 33/11kV Power Transformer(s), complete with all fittings, accessories, associated equipment's, spares, 10% extra Transformer Oil, required for its satisfactory operation in any of the sub-stations of the purchaser.

The Transformer shall be of outdoor type with tap changers as detailed below.

3.15 MVA - OFF Load Tap Changer

5.00 MVA - ON Load in Tank/Flange Mounted type Tap Changer (with TMU Control Panel)

8.00 MVA - ON Load in Tank/Flange Mounted type Tap Changer (with TMU Control Panel)

10.00 MVA - ON Load in Tank/Flange Mounted type Tap Changer (with TMU Control Panel)

- 1.2** The core shall be constructed from high grade, non-aging Cold Rolled Grain Oriented (CRGO) annealed silicon steel laminations, having low loss and good grain properties, coated with hot oil proof insulation conforming to HIB grade of BIS certified with lamination thickness not more than 0.23mm to 0.27mm or better (Quoted grade and type shall be used) bolted together to the frames firmly to prevent vibration or noise. The grade of core shall be M3 or better. All core clamping bolts (If any) shall be effectively insulated. Only one grade and one thickness of core shall be accepted and no mixing of different grades shall be allowed. The complete design of the core must ensure permanency of the core losses with continuous working of the transformers. The value of the maximum flux density allowed in the design & grade of laminations used shall be clearly stated in the offer.
- 1.3** The maximum flux density in any part of the cores and yoke at normal voltage and frequency shall be such that it should under 10% overvoltage condition should not be more than 1.9 Tesla. The supplier shall provide saturation curve of the core material, proposed to be used. Laminations of different grade(s) and different thickness (s) are not allowed to be used in any manner or under any circumstances.
- 1.4** The scope of supply includes the provision of type test. The equipment offered should have been successfully type tested within five years from date of tender and the designs should have been in satisfactory operation for a period not less than three years as on the date of order. Compliance shall be demonstrated by submitting, (i) authenticated copies of the type test reports and (ii) performance certificates from the users, specifically from Central Govt./State Govt. or their undertakings.
- 1.5** The Power Transformer shall conform in all respects to highest standards of engineering, design, workmanship, this specification and the latest revisions of relevant standards at the time of offer and the employer shall have the power to reject any work or material, which, in his judgment, is not in

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full accordance therewith. The Transformer(s) offered, 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 supply, irrespective of whether those are specifically brought out in this specification and / or the commercial order or not.

The Engineer reserves the right to reject the transformers if on testing the losses exceed the declared losses beyond tolerance limit as per IS or the temperature rise in oil and / or winding exceeds the value, specified in technical particular or impedance value differ from the guaranteed value including tolerance as per this specification and if any of the test results do not match with the values, given in the guaranteed technical particulars and as per technical specification.

2. SPECIFIC TECHNICAL REQUIREMENTS

1	Natural Cooling Rating (MVA) (ONAN)	3.15 5.00 8.00 10.00 MVA
2	No. of phases	3
3	Type of installation	Outdoor
4	Frequency	50 Hz (\pm 5%)
5	Cooling medium	Insulating Oil (ONAN)
6	Type of mounting	On Wheels, Mounted on rails.
7	Rated voltage	
7 (a)	High voltage winding	33kV
7 (b)	Low voltage winding	11kV
8 (a)	Highest continuous system voltage a) Maximum system voltage ratio (HV / LV)	36KV / 12 KV
8 (b)	b) Rated voltage ratio (HV / LV)	33KV / 11KV
9	No. of windings	Two winding Transformers
10	Type of cooling	ONAN (Oil natural / Air natural)
11	MVA Rating corresponding to ONAN Cooling system	100%
12	Method of connection: HV : LV :	Delta Star
13	Connection symbol	Dyn 11
14	System earthing	Neutral of LV side to be solidly earthed.
15	Percentage impedance voltage on Normal tap and MVA base at 75°C corresponding to HV/ LV rating and applicable tolerances (No negative tolerance will be allowed)	% Impedance for 3.15 MVA - 6.25%, 5 MVA - 7.15% 8 MVA - 8.35% 10 MVA-8.35% (Tolerance +10%)

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16	Intended regular cyclic overloading of windings	As per IEC –76-1, Clause 4.2	
17(a)	Anticipated unbalanced loading	Around 10%	
17(b)	Anticipated continuous loading of windings (HV / LV)	110 % of rated current	
18(a)	Type of tap changer	On load In-tank or flange mounted tap changer for 5 MVA ,8 MVA , 10 MVA and OFF load tap changer in 3.15 MVA	
18(b)	Range of taping	+ 5% to – 15% in 8 equal steps of 2.5% each on HV winding, 9 tap positions. Tap no 3 will be the principal tap position	
19	Neutral terminal to be brought out	On LV side only	
20	Over Voltage operating capability and duration	112.5 % of rated voltage (continuous)	
21	Maximum Flux Density in any part of the core and yoke at rated MVA with +112.5% combined voltage and frequency variation from rated voltage i.e. 33 kV/11 kV and frequency of 50 Hz.	1.9 Tesla	
22	Insulation levels for windings: - 1.2 / 50 microsecond wave shape Impulse withstand (KVP)	33kV	11kV
		170kV	75kV
22(a)	Power frequency voltage withstand (KV rms)	70kV	28kV
23	Type of winding insulation		
23(a)	HV winding	Uniform	
23(b)	LV winding	Uniform	
24	Withstand time for three phase short circuit	2 Seconds	
25	Noise level at rated voltage and frequency	As per NEMA Publication No. TR-1.	
26	Permissible Temperature rise over ambient temperature of 40/45°C		
26 (a)	Of top oil measured by thermometer	40 °C	
26(b)	Of winding measured by resistance	45 °C	

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27	Minimum clearances in air (mm) :-	Phase to Phase	Phase to ground
27(a)	HV	400	320
27(b)	LV	280	140
28	Terminals		
28(a)	HV winding line end 36 KV oil filled communicating type porcelain bushings (Anti-fog type)		
28(b)	LV winding 12 KV porcelain type of bushing (Anti-fog type) – for outdoor 11 KV breakers <i>(11KV Power cables shall be used for extending supply to 11KV breakers in case of indoor circuit breakers. The termination of 11 KV cables on LV bushing shall be through extended copper bus bars suitable to hold power cables termination. A metallic cable termination box, completely sealed, shall be installed on LV side of the transformer in which cables shall enter from bottom gland plates.)</i>		
29	Insulation level of bushing	HV	LV
29(a)	Lightning Impulse withstand (KVP)	170	75
29(b)	1 Minute Power Frequency withstand voltage (KV – rms)	70	28
29(c)	Creepage distance (mm) (minimum)	900	300
30	Material of HV & LV Conductor	Electrolytic Copper	
31	Maximum current density for HV and LV winding for rated current	2.6tap A/MM ²	
32	Polarization index (HV to LV, HV to Earth & LV to earth)	IR Test = 1 minute value/ 15 seconds value will not be less than 1.5. IR Test = 10 minutes value / 1 minute value will not be more than 5 and less than 1.5.	
33	Core Assembly	Boltless type	
34	Temperature Indicator		
34(a)	Oil	One number	
34(b)	Winding	One number	
35	Paper covering thickness of HV winding	0.6 mm(minimum)	
36	Paper covering thickness of LV winding	0.5 mm(minimum)	
37	Clearances		
37(a)	Gap between HV coil to the inside of the tank on the longer side	65 mm(minimum)	

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37(b)	Gap between HV coil to the inside of the tank on the longer side(LV Side)	65 mm(minimum)
37(c)	Gap between HV coil to the inside of the tank on the width side (HV side to accommodate delta and tapping leads)	115 mm(minimum)
37(d)	Gap between core yoke to tank bottom	55mm (minimum)
37(e)	Gap between core yoke to tank bottom	55mm (minimum)
37(f)	Gap between core yoke to tank bottom	20 mm(minimum)
37(g)	Gap between core yoke to tank bottom	20 mm(minimum)
37(h)	Radial clearance between core to LV coil	12.5mm(minimum)
38	The difference of Ampere Turns at each location shall not be more than 5 % at all percentages of tappings	
39	Winding to winding clearance should have minimum 20% of sum of pressboard Cylinder/Barrier.	
40	Tap changing gear	
	Type	In Tank/Flange mounted, High speed Resistor type
	Provided on	HV side
	Tap Range	-15% to +5%
	Tap step	2.5% of 33kV (8 equal steps)
	Minimum rated current	For 3.15 MVA-100A, 5MVA-150A ,8 MVA-200A, 10 MVA-320A
	Minimum rated short circuit current	3kA
	Automatic control required	Yes
	Remote control panel required	Yes
	Marshalling kiosk required	Yes
	Minimum air core reactance of HV winding	20%
	Type of oil preservation	Air-cell-type
34	Losses: - The losses shall not exceed the value given below	

MVA Rating	No-load losses (Fixed loss) KW	Load losses at 75°C KW	Percentage impedance voltage on normal tap and MVA base at 75° C
3.15	3	16	7.15
5	4	23	7.15

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8	5.5	40	8.35
10	7	50	8.35

2.1 MARSHALLING BOX

A metal enclosed, weather, vermin and dust proof marshalling box fitted with required glands, locks, glass door, terminal Board, heater with switch, illumination lamp with switch etc. shall be provided with each transformer to accommodate temperature indicators, terminal blocks etc. It shall have degree of protection of IP 55 or better as per IS: 2147 (Refer Clause 3.12).

2.2 CAPITALIZATION OF LOSSES AND LIQUIDATED DAMAGES

Capitalization of losses will be as per Annexure B which is attached herewith. No (+)ve tolerance shall be allowed at any point of time, on the quoted losses after the award. In case, the losses during type testing, routine testing etc. are found above the quoted losses, the award shall stand cancelled. In such a case, the CPG money shall also be forfeited.

2.3 PERFORMANCE

- i) Transformer shall be capable of withstanding for two seconds without damage to any external short circuit, with the short circuit MVA available at the terminals.
- ii) The maximum flux density in any part of the core and yoke at rated Voltage and frequency shall be such that the flux density with +12.5% combined voltage and frequency variation from rated voltage and frequency shall not exceed 1.9Tesla.
- iii) Transformer shall under exceptional circumstances due to sudden disconnection of the load, be capable of operating at the voltage approximately 25% above normal rated voltage for a period of not exceeding one minute and 40% above normal for a period of 5 seconds.
- iv) The transformer may be operated continuously without danger on any particular tapping at the rated MVA \pm 1.25% of the voltage corresponding to the tapping.
- v) The thermal ability to withstand short circuit shall be demonstrated by calculation.
- vi) Transformer shall be capable of withstanding thermal and mechanical stress caused by any symmetrical and asymmetrical faults on any winding.

2.4 DRAWINGS/ DOCUMENTS INCORPORATING THE FOLLOWING PARTICULARS SHALL BE SUBMITTED WITH THE BID

- a) General outline drawing showing shipping dimensions and overall dimensions, net weights and shipping weights, quality of insulating oil, spacing of wheels in either direction of motion, location of coolers, marshalling box and tap changers etc.
- b) Assembly drawings of core, windings etc. and weights of main components / parts.
- c) Height of center line on HV and LV connectors of transformers from the rail top level.
- d) Dimensions of the largest part to be transported.

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- e) GA drawings / details of various types of bushing
- f) Tap changing and Name Plate diagram
- g) Type test certificates of similar transformers.
- h) Illustrative & descriptive literature of the Transformer.
- i) Maintenance and Operating Instructions.

2.5 MISCELLANEOUS

- i) Padlocks along with duplicate keys as asked for various valves, marshalling box etc. shall be supplied by the contractor, wherever locking arrangement is provided.
- ii) Foundation bolts for wheel locking devices of Transformer shall be supplied by the Contractor.

2.6 DELIVERY

The full quantity of the equipment's shall be delivered as per the delivery schedule appended to this specification.

2.7 SCHEDULES

All Schedules annexed to the specification shall be duly filled by the bidder separately.

2.8 ALTITUDE FACTOR

Necessary correction factors as given in the Indian Standard for oil temperature rise, insulation level etc. shall be applied to the Standard Technical Parameters given above.

2.9 NAME PLATE

Transformer rating plate shall contain the information as given in clause 15 of IS-2026 (part-I). The details on rating plate shall be finalized during the detailed engineering. Further, each transformer shall have inscription of Employer's name. The name plate shall also include (i) The short circuit rating , (ii) Measured no load current and no load losses at rated voltage and rated frequency, (iii) measured load losses at 75° C (normal tap only), (iv) D.C resistance of each winding at 75° C.

3. SERVICE CONDITIONS

CLIMATIC CONDITIONS

The service conditions shall be as follows:

1. Maximum altitude above sea level 1,000m
2. Maximum ambient air temperature 50°C
3. Maximum daily average ambient air temperature 35°C
4. Minimum ambient air temperature 0°C
5. Maximum relative humidity 95%

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6. Average number of thunderstorm days per annum (isokeraunic level) 70
7. Average number of rainy days per annum 120
8. Average annual rainfall 150cm
9. Earthquakes of an intensity in horizontal direction - equivalent to seismic acceleration of 0.3g
10. Earthquakes of an intensity in vertical direction - equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity)
13. Wind velocity: 300 km/hr., 200 km/hr. and 160 km/hr.

Environmentally, the region where the equipment will be installed 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 outdoor insulators. Therefore, outdoor material and equipment shall be designed and protected for use in exposed, heavily polluted, salty, corrosive, tropical and humid coastal atmosphere.

4. SYSTEM CONDITIONS

The equipment shall be suitable for installation in supply systems of the following characteristics.

Frequency	50 Hz± 5%	
Nominal system voltages	33 KV 11 KV	
Maximum system voltages	33KV System	36.3 KV
	11 KV System	12 KV
Nominal short circuit level (Basing on apparent power)	33KV System	31.5KA
	11 KV System	13.1KA
Insulation levels : 1.2/50 µ sec impulse withstand voltage	33KV System	170KV (peak)
	11 KV System	75 KV (peak)
Power frequency one minute withstand (wet and dry) voltage	33KV System	70KV (rms)
	11 KV System	28KV (rms)
Neutral earthing arrangements	11 KV System	Solidly earthed

5. CODES & STANDARDS

- 5.1 The design, material, fabrication, manufacture, inspection, testing before dispatch and performance of power transformers at site shall comply with all currently applicable statutory regulations and safety codes in the locality where the equipment will be installed. The equipment shall also conform to the latest applicable standards and codes of practice. Nothing in this specification shall be construed to relieve the contractor of this responsibility.
- 5.2 The equipment and materials covered by this specification shall conform to the latest applicable provision of the following standards.

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IS: 5	Color for ready mixed paints
IS: 325	Three Phase Induction Motors
IS: 335	New insulating oil for transformers, switch gears
IS: 1271	Classification of insulating materials for electrical machinery and apparatus in relation to their stability in services
IS: 2026(Part I to IV)	Power Transformer
IS: 2071	Method of high voltage testing
IS: 2099	High voltage porcelain bushings
IS: 2147	Degree of protection
IS: 2705	Current Transformers
IS: 3202	Code of practice for climate proofing of electrical equipment
IS: 3347	Dimensions for porcelain Transformer Bushings
IS: 3637	Gas operated relays
IS: 3639	Fittings and accessories for power Transformers
IS: 5561	Electric Power Connectors
IS: 6600/BS: CP"10:0	Guide for loading of oil immersed Transformers
IS: 10028	Code of practice for selection, installation and maintenance of transformers, Part I. II and III
C.B.I.P. Publication	Manual on Transformers

If the standard is not quoted for any item, it shall be presumed that the latest version of Indian Standard shall be applicable to that item. The equipment complying other internationally accepted standards, may also be considered if they ensure performance superior to the Indian Standards.

5.3 DRAWINGS

- a) The contractor shall furnish, within fifteen days after issuing of Letter of Award. Six copies each of the following drawings/documents incorporating the transformer rating for approval.
- i) Detailed overall general arrangement drawing showing front and side elevations and plan of the transformer and all accessories including radiators and external features with details of dimensions, spacing of wheels in either direction of motion, net weights and shipping weights, crane lift for un-tanking, size of lugs and eyes, bushing lifting dimensions, clearances between HV and L.V terminals and ground, quantity of insulating oil etc.
 - ii) Assembly drawings of core and winging and weights of main components / parts
 - iii) Foundation plan showing loading on each wheel land jacking points with respect to center line of transformer.
 - iv) GA drawings details of bushing and terminal connectors.
 - v) Name plate drawing with terminal marking and connection diagrams.
 - vi) Wheel locking arrangement drawing.

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- vii) Transportation dimensions drawings.
- viii) Magnetization characteristic curves of PS class neutral and phase side current transformers, if applicable.
- ix) Interconnection diagrams.
- x) Over fluxing withstand time characteristic of transformer.
- xi) GA drawing of marshalling box.
- xii) Control scheme/wiring diagram of marshalling box.
- xiii) Technical leaflets of major components and fittings.
- xiv) As built drawings of schematics, wiring diagram etc.
- xv) Setting of oil temperature indicator, winding temperature indicator.
- xvi) Completed technical data sheets.
- xvii) Details including write-up of tap changing gear.
- xviii) HV & LV bushing.
- xix) Bushing Assembly.
- xx) Bi-metallic connector suitable for connection to 100 mm² up to 232 mm² AAAC Conductor.
- xxi) GA of LV cable Box.
- xxii) Radiator type assembly.

b) All drawings, documents, technical data sheets and test certificates, results calculations shall be furnished.

5.4 Any approval given to the detailed drawings by the Employer's shall not relieve the contractor of the responsibility for correctness of the drawing and in the manufacture of the equipment. The approval given by the employer shall be general with overall responsibility with contractor.

6. GENERAL CONSTRUCTIONAL FEATURES

6.1 All material used shall be of best quality and of the class most suitable for working under the conditions specified and shall withstand the variations of temperature and atmospheric conditions without distortion or deterioration or the setting up of undue stresses which may impair suitability of the various parts for the work which they have to perform.

6.2 Similar parts particularly removable ones shall be interchangeable.

6.3 Pipes and pipe fittings, screws, studs, nuts and bolts used for external connections shall be as per the relevant standards. Steel bolts and nuts exposed to atmosphere shall be galvanized.

6.4 Nuts, bolts and pins used inside the transformers and tap changer compartments shall be provided with lock washer or locknuts.

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- 6.5** Exposed parts shall not have pockets where water can collect.
- 6.6** Internal design of transformer shall ensure that air is not trapped in any location.
- 6.7** Material in contact with oil shall be such as not to contribute to the formation of acid in oil. Surface in contact with oil shall not be galvanized or cadmium plated
- 6.8** Labels, indelibly marked, shall be provided for all identifiable accessories like Relays, switches current transformers etc. All label plates shall be of in corrodible material.
- 6.9** All internal connections and fastenings shall be capable of operating under overloads and over- excitation, allowed as per specified stands without injury.
- 6.10** Transformer and accessories shall be designed to facilitate proper operation, inspection, maintenance and repairs.
- 6.11** No patching, plugging, shimming or other such means of overcoming defects, discrepancies or errors will be accepted.
- 6.12** Schematic Drawing of the wiring, including external cables shall be put under the propane sheet on the inside door of the transformer marshalling box.
- 6.13 Painting**
- 6.13.1 All paints shall be applied in accordance with the paint manufacturer's recommendations. Particular attention shall be paid to the following:
- a) Proper storage to avoid exposure as well as extremes of temperature.
 - b) Surface preparation prior to painting.
 - c) Mixing and thinning
 - d) Application of paints and the recommended limit on time intervals between coats.
 - e) Shelf life for storage.
- 6.13.2 All paints, when applied in normal full coat, shall be free from runs, sags, wrinkles, patchiness, brush marks or other defects.

All primers shall be well marked into the surface, particularly in areas where painting is evident, and the first priming coat shall be applied as soon as possible after cleaning. The paint shall be applied by airless spray according to the manufacturer's recommendations. However, wherever airless spray is not possible, conventional spray be used with prior approval of Employer.

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6.13.3 The supplier shall, prior to painting protect nameplates, lettering gauges, sight glasses, light fittings and similar such items.

6.13.4 Cleaning and Surface Preparation

1. After all machining, forming and welding has been completed, all steel work surfaces shall be thoroughly cleaned of rust, scale, welding slag or spatter and other contamination prior to any painting.
2. Steel surfaces shall be prepared by Sand/Shot blast cleaning or chemical cleaning by seven tank process including Phosphate to the appropriate quality.
3. The pressure and Volume of the compressed air supply for the blast cleaning shall meet the work requirements and shall be sufficiently free from all water contamination prior to any painting.
4. Chipping, scraping and steel wire brushing using manual or power driven tools cannot remove firmly adherent mill-scale and shall only be used where blast cleaning is impractical.
5. Protective Coating As soon as all items have been cleaned and within four hours of the subsequent drying, they shall be given suitable anticorrosion protection.

6.13.5 Paint Material

Followings are the type of paints that may be suitably used for the items to be painted at shop and supply of matching paint to site:

- i) Heat resistant paint (Hot oil proof) for inside surface.
- ii) For external surfaces one coat of Thermo Setting Paint or 2 coats of Zinc chromate followed by 2 coats of POLYURETHANE. The color of the finishing coats shall be dark admiral grey conforming to No.632 or IS 5:1961.

6.13.6 Painting Procedure

1. All painting shall be carried out in conformity with both specifications and with the paint manufacture's recommendations. All paints in any one particular system. Whether shop or site applied, shall originate from one paint manufacturer.
2. Particular attention shall be paid to the manufacturer's instructions on storage, mixing, thinning and pot life. The paint shall only be applied in the manner detailed by the manufacturer e.g. brush, roller, conventional or airless spray and shall be applied under the manufacturer's recommended conditions. Minimum and maximum time intervals between coats shall be closely followed.
3. All prepared steel surfaces should be primed before visible re-rusting occurs or within 4 hours whichever is sooner. Chemical treated steel surfaces shall be primed as soon as the surface is dry and while the surface is warm.

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4. Where the quality of film is impaired by excess film thickness, (wrinkling, mud cracking or general softness) the supplier shall remove the unsatisfactory paint coatings and apply another. As a general rule, dry film thickness should not exceed the specified minimum dry film thickness by more than 25%. In all instances, where two or more coats of the same paints are specified, such coatings may or may not be of contrasting colors.
5. Paint applied to items that are not to be painted, shall be removed at supplier's expense, leaving the surface clean, un-stained and undamaged.

6.13.7 Damages to Paints Work

1. Any damage occurring to any part of the painting scheme shall be made good to the same standard of corrosion protection and appearance as that originally employed.
2. Any damaged paint work shall be made as follows:
 - a) The damaged area, together with an area extending 25mm around its boundary, shall be cleaned down to bare metal.
 - b) A priming coat shall immediately applied, followed by a full paint finish equal to that originally applied and extending 50mm around the perimeter of the originally damaged.
3. The repainted surface shall present a smooth surface. This shall be obtained by carefully chamfering the paint edges before & after priming.

6.13.8 Dry Film Thickness

1. To the maximum extent practicable, the coats shall be applied as a continuous film of uniform thickness and free of pores. Over-spray, skips, runs, sags and drips should be avoided. The different coats may or may not be same color.
2. Each coat of paint shall allowed to harden before the next is applied as per manufacture's recommendations.
3. Particular attention must be paid to full film thickness at edges.
4. The requirement for the dry film thickness (DFT) of paint and the material to be used shall be as given below:

Sl. No	Paint Type	Area to be painted	No of Coats	Total Dry film thickness(Min)
1	Liquid paint			
	a) Zinc Chromate (Primer)	Outside	02	45 micron
	b) POLYURETHANE Paint (Finish Coat)	Outside	02	35 micron
	c) Hot Oil paint	Inside	01	35 micron

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7. DETAILED DESCRIPTION

7.1 Tank

- 7.1.1 The Transformer tank and cover shall be fabricated from high grade low carbon plate steel of tested quality. The tank shall be of welded construction.
- 7.1.2 Tank shall be designed to permit lifting by crane or jacks of the complete transformer assembly filled with oil. Suitable lugs and bossed shall be provided for this purpose.
- 7.1.3 All breams, flanges, lifting lugs, braces and permanent parts attached to the tank shall be welded and where practicable, they shall be double welded.
- 7.1.4 The main tank body of the transformer, excluding tap changing compartments and radiators, shall be capable of withstanding pressure of 760mm of Hg.
The side Tank wall shall be of 6mm thickness (minimum) for 3.15MVA and 8mm (minimum) for 5MVA and 10 mm for 8MVA & 10 MVA. The bottom and Top Plate of the Tank shall be of 8mm thickness (minimum) for 3.15MVA, 10mm (minimum) for 5MVA and 12mm.(minimum) for 8MVA & 10MVA. Thickness for conservator tank shall be 06 mm minimum.
- 7.1.5 Inspection hole(s) with welded flange(s) and bolted cover(s) shall be provided on the tank cover. The inspection hole(s) shall be of sufficient size to afford easy access to the lower ends of the bushings, terminals etc.
- 7.1.6 Gaskets of nitrile rubber or equivalent shall be used to ensure perfect oil tightness. All gaskets shall be closed design (without open ends) and shall be of one piece only. Rubber gaskets used for flange type connections of the various oil compartments, shall be laid in grooves or in groove- equivalent sections on bolt sides of the gasket, throughout their total length. Care shall be taken to secure uniformly distributed mechanical strength over the gaskets and retains throughout the total length. Gaskets of neoprene and / or any kind of impregnated / bonded core or cork only which can easily be damaged by over-pressing are not acceptable. Use of hemp as gasket material is also not acceptable.
- 7.1.7 Suitable guides shall be provided for positioning the various parts during assemble or dismantling. Adequate space shall be provided between the cores and windings and the bottom of the tank for collection of any sediment.
- 7.1.8 The transformer tank and cover shall be fabricated from good commercial grade low carbon steel suitable for welding and shall be of adequate thickness.
- 7.1.9 The tank and the cover shall be of welded construction. All seams shall be welded and where practicable they shall be double welded.
- 7.1.10 The tank shall have sufficient strength to withstand without permanent distortion (i) filling by vacuum and (ii) continuous internal gas pressure of 0.35 atmospheric with oil and operating level.
- 7.1.11 The tank material shall be as per IS: 2026 or equivalent with ultrasonic testing done for elimination of defects in rolled plates.

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- 7.1.12 The welding shall be as per prior approved WPS (Welding Procedure Specs) by trained and tested welders.
- 7.1.13 The welding plan shall be shown in general i.e. Category-wise or for each type of weld in the mechanical fabrication drawing, which shall be submitted to Purchaser.
- 7.1.14 All fittings like elbows, bends etc. shall be seamless as per applicable American or Indian Standards.
- 7.1.15 No resistance welding of fasteners shall be done anywhere on the transformer.
- 7.1.16 The tank shall have an oil tight bolted flanged joint near the base of the transformer so that the tank can be lifted off to provide access to the core and coils.
- 7.1.17 To ensure oil tightness, recessed neoprene or equivalent gaskets shall be used.
- 7.1.18 Manholes with welded flange and bolted covers shall be provided on the tank.
- 7.1.19 The manhole shall be of sufficient size to afford easy access to the lower ends of all the bushings, OLTC terminals etc. to permit replacement of auxiliaries without removing tank covers.
- 7.1.20 Inspection covers on elevation (on vertical plane) shall be provided for all HV bushing turrets.
- 7.1.21 Suitable guides shall be provided for positioning the various parts during assembly or dismantling.
- 7.1.22 Adequate space shall be provided between the cores and windings and the bottom of the tank for collection of any sediment.
- 7.1.23 All joints including bolted as well as flanged, shall have machined matching surfaces/inner edges with smooth finish, to ensure leak proof joints.
- 7.1.24 Lifting eyes or lugs shall be provided on all parts of the transformer requiring independent handling during assembly or dismantling. In addition, the transformer tank shall be provided with lifting lugs and bosses properly secured to the sides of the tank, for lifting the transformer either by crane or by jacks.
- 7.1.25 The design of the tank, the lifting lugs and bosses shall be such that the complete transformer assembly filled with oil can be lifted with the use of these lugs without any damage or distortions.
- 7.1.26 The tank shall be provided with two nos. of suitable copper alloy lugs for the purpose of grounding.
- 7.1.27 The grounding pads should be mirror finished. Two grounding pads, located on opposite sides of the tank shall be provided with two tapped holes for connecting it with station ground mat. Necessary hardware like M10 GS bolts and spring washers shall also be provided for connections.
- 7.1.28 Each tank shall be equipped with the following valves with standard flange connection for external piping:
- a) One drain valve located on the low voltage side of the transformer and placed to completely drain the tank. At the option of the Purchaser's a large valve may be furnished with an eccentric reducer. This valve shall be equipped with a small sampling cock.
 - b) One filter valve located at the top of the tank on the high-voltage side. The opening of this valve shall be baffled to prevent aeration of the oil.
 - c) One filter valve, located slightly above the bottom of the tank.
 - d) One relief valve to operate at a pressure below the test pressure for the tank.
 - e) Other two nos. valves shall also be provided, as required for proper functioning of the transformer.

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f) A suitable locking arrangement shall be provided for locking these valves in close/open position.

- 7.1.29 All valves should be provided with clear open/close position indications. Wherever rising spindle type valves are provided the valves should be clockwise rotating for closing operations.
- 7.1.30 For the auxiliary lead wiring from individual instrument to marshalling box, the cables shall be provided in the conduits.
- 7.1.31 All the transformers shall be provided with a ladder having 'anti-climbing' device.
- 7.1.32 Transformer tank shall be of welded sheet steel construction and provided with gaskets steel cover plates.
- 7.1.33 Base shall be suitably reinforced to prevent any distortion during lifting. Base channels shall be provided with skids and pulling eyes to facilitate handling.
- 7.1.34 All seams shall be electrically double welded for absolute oil tightness.
- 7.1.35 Equipotential strips to be provided at the gasket joints and at any other suitable locations.
- 7.1.36 Suitable arrangement shall be made for mounting HV and LV lightning arrestors of the transformer.
- 7.1.37 Guards shall be provided for drain, bottom sampling and filter valves to prevent oil pilferage.

7.2 Tank Cover

The transformer top shall be provided with a detachable tank cover with bolted flanged gasket joint. Lifting lugs shall be provided for removing the cover. The surface of the cover shall be suitable sloped so that it does not retain rain water.

7.3 UNDER CARRIAGE

The transformer tank filled with oil shall be supported on steel structure with detachable plain rollers. Suitable channels for movement of roller with transformer shall be space accordingly, rollers wheels shall be provided with suitable rollers bearings, which will resist rust and corrosion and shall be equipped with fittings for lubrication.

7.4 CORE

- 7.4.1 Each lamination shall be insulated such that it will not deteriorate due to mechanical pressure and the action of hot transformer oil.
- 7.4.2 The core shall be constructed either from high grade, non-aging Cold Rolled Grain Oriented (CRGO) silicon steel laminations conforming to HIB grade with lamination thickness not more than 0.23mm to 0.27mm or better(Quoted grade and type shall be used). The maximum flux density in any part of the cores and yoke at normal voltage and frequency shall not be more than 1.69 Tesla. The Bidder shall provide saturation curve of the core material, proposed to be used. Laminations of different grade(s) and different thickness (s) are not allowed to be used in any manner or under any circumstances.

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CRGO steel for core shall be purchased only from the approved vendors, list of which is available at <http://apps.powergridindia.com/ims/ComponentList/Power-former%20upto%20420%20kV- CM%20List.pdf>

7.4.3 The bidder should offer the core for inspection starting from the destination port to enable Employer for deputing inspecting officers for detail verification as given below and approval by the Employer during the manufacturing stage. Bidder's call notice for the purpose should be accompanied with the following documents as applicable as a proof towards use of prime core material: The core coils, if found suitable, are to be sealed with proper seals which shall be opened in presence of the inspecting officers during core-cutting at the manufacturer's or its sub-vendor's premises as per approved design drawing.

- a) Purchase Order No. & Date.
- b) Invoice of the supplier
- c) Mills test certificate
- d) Packing list
- e) Bill of lading
- f) Bill of entry certificate to customs

Core material shall be directly procured either from the manufacturer or through their accredited marketing organization of repute, but not through any agent.

Please refer to "**Check-list for Inspection of Prime quality CRGO for Transformers**" attached at Annexure-A. It is mandatory to follow the procedure given in this Annexure.

7.4.4 The laminations shall be free of all burrs and sharp projections. Each sheet shall have an insulating coating resistant to the action of hot oil.

7.4.5 Purchaser shall impose heavy penalty or black list bidders using seconds/ defective CRGO sheets or load losses found to be more than stipulated limit

7.4.6 The core frame shall be provided with lugs suitable for lifting the complete core and coil assembly of the transformer.

7.4.7 The insulation structure for the core to bolts and core to clamp plates, shall be such as to withstand 2000 V DC voltage for one minute.

7.4.8 The completed core and coil shall be so assembled that the axis and the plane of the outer surface of the core assemble shall not deviate from the vertical plane by more than 25mm.

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7.4.9 All steel sections used for supporting the core shall be thoroughly shot or sand blasted, after cutting, drilling and welding.

1. The finally assembled core with all the clamping structures shall be free from deformation and shall not vibrate during operation.

7.4.10 The core clamping structure shall be designed to minimize eddy current loss.

7.4.11 The framework and clamping arrangements shall be securely earthed.

7.4.12 The core shall be carefully assembled and rigidly clamped to ensure adequate mechanical strength.

7.4.13 Oil ducts shall be provided, where necessary, to ensure adequate cooling inside the core. The welding structure and major insulation shall not obstruct the free flow of oil through such ducts.

7.4.14 The design of magnetic circuit shall be such as to avoid static discharges, development of short circuit paths within itself or to the earth clamping structure and production of flux component at right angle to the plane of the lamination, which may cause local heating. The supporting framework of the cores shall be so designed as to avoid the presence of pockets, which would prevent complete emptying of the tank through the drain valve or cause trapping of air during filling.

7.4.15 The construction is to be of boltless core type. The core shall be provided with lugs suitable for lifting the complete core and coil assembly. The core and coil assembly shall be so fixed in the tank that shifting will not occur during transport or short circuits. The supporting framework of the core shall be so designed as to avoid presence of pockets which would prevent complete emptying of tank through drain valve or cause trapping of air during oil filling.

7.4.16 The temperature gradient between core & surrounding oil shall be maintained less than 20 deg. Centigrade. The manufacturer shall demonstrate this either through test (procurement to be mutually agreed) or by calculation.

7.4.17 Suitable buffer locking arrangement to be provided by providing guide channel, stopper and other suitable insulating material so that core and its associated channel do not move during transportation.

7.5 INTERNAL EARTHING

7.5.1 All internal metal parts of the transformer, with the exception of individual laminations and their

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individual clamping plates shall be earthed.

a) The grounding lead from the core shall be brought out of the tank through a 11 kV class bushing and grounded externally.

7.5.2 A protective cover shall be provided for the bushing.

7.5.3 The core grounding rod (stem) through the bushing shall be solid rod (stem).

7.5.4 The design of core grounding arrangement shall be such that the grounding links shall not come out of core during installation as well service conditions.

7.5.5 The supplier shall submit a drawing clearly showing the details of core grounding.

7.5.6 The core / frame grounding's both connections shall be brought out through a suitable bushing for provision of external grounding.

7.5.7 The magnetic circuit shall be connected to the clamping structure at one point only and this shall be brought out of the top cover of the transformer tank through a suitably rated insulator. A disconnecting link shall be provided on transformer tank to facilitate disconnections from ground for IR measurement purpose.

7.5.8 Coil clamping rings of metal at earth potential shall be connected to the adjacent core clamping structure on the same side as the main earth connections.

7.6 WINDING

7.6.1 Winding shall be subjected to a shrinking and seasoning process, so that no further shrinkage occurs during service. Adjustable devices shall be provided for taking up possible shrinkage in service.

7.6.2 All low voltage windings for use in the circular coil concentric winding shall be wound on a performed insulating cylinder for mechanical protection of the winding in handling and placing around the core.

7.6.3 Winding shall not contain sharp bends which might damage the insulation or produce high dielectric stresses. No strip conductor wound on edge shall have width exceeding six times the thickness.

The conductors shall be of electrolytic grade copper free from scales and burrs. The conductor insulation shall be made from high-density (at least 0.75 gm. /cc) paper having high mechanical strength. The barrier insulation including spacers shall be made from high-density pre-compressed pressboard (1.1 gm./cc minimum for load bearing and 1 to 1.3 gm./cc minimum for non-load bearing) to minimize dimensional changes.

7.6.4 Materials used in the insulation and assembly of the windings shall be insoluble, non-catalytic and chemically inactive in the hot transformer oil and shall not soften or be otherwise affected under the operating conditions.

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- 7.6.5 Winding and connections shall be braced to withstand shocks during transport or short circuit.
- 7.6.6 Permanent current carrying joints in the windings and leads shall be welded or brazed. Clamping bolts for current carrying parts inside oil shall be made of oil resistant material which shall not be affected by acidity in the oil steel bolts, if used, shall be suitably treated.
1. Terminals of all windings shall be brought out of the tank through bushings for external connections. The winding shall be brought out through bushing and provided with suitable terminal connectors, the details of which will be forwarded later.
 2. The tolerance for the winding resistance measurement for different phases but at same taps shall be limited to 1%. The windings shall be brought out through bushing. The windings shall be designed to withstand the specified thermal and dynamic short-circuit stresses.
 3. The end turns of the high voltage windings shall have reinforced insulation to take care of the voltage surges likely to occur during switching or any other abnormal condition.
 4. Winding shall be suitable for connection of reactors or capacitors which would be subjected to frequent switching. All the windings shall be capable of withstanding stresses that may be caused by such switching.
 5. Primary and secondary windings shall be constructed from high- conductivity (copper conductors), Double Paper Covered (DPC) with minimum 30% overlapping of insulation at each layer copper conductor.
 6. The insulation between core and bolts and core and clamps shall withstand **2.5 kV for one minute**.
 7. Proper bonding of inter layer insulation with the conductor shall be ensured. Test for bonding strength shall be conducted as per standards.
 8. All turns of windings shall be adequately supported (by which material) to prevent movement. The core/coil assembly shall be securely held in position to avoid any movement under short circuit conditions.
 9. **The joints in the winding shall be avoided but if it is necessary then, these shall be properly brazed and the resistance of the joints shall be less than that of parent conductor. Crimping is not allowed at any joints.**
- 7.6.7 The completed core and coil assemble shall be dried in vacuum at not more than 0.5mm of mercury absolute pressure and shall be immediately impregnated with oil after the drying process to ensure the elimination of air and moisture within the insulation. Vacuum may be applied in either vacuum over or in the transformer tank.
- 7.6.8 The winding shall be so designed that all coil assemblies of identical voltage ratings shall be interchangeable and field repairs to the winding can be made readily without special equipment. The coils shall have high dielectric strength.

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- 7.6.9 Coils shall be made of continuous smooth high grade electrolytic copper conductor, shaped and braced to provide for expansion and contraction due to temperature changes.
- 7.6.10 Adequate barriers shall be provided between coils and core and between high and low voltage coil. End turn shall have additional protection against abnormal line disturbances.
- 7.6.11 The insulation of winding shall be designed to withstand voltage stress arising from surge in transmission lines due to atmospheric or transient conditions caused by switching etc.
- 7.6.12 Tapping shall not be brought out from inside the coil or from intermediate turns and shall be so arranged as to preserve as far as possible magnetic balance of transformer at all voltage ratios.
- 7.6.13 Magnitude of impulse surges transferred from HV to LV windings by electromagnetic induction and capacitance coupling shall be limited to BILL of LV winding.
- 7.6.14 The coils shall be supported between adjacent sections by insulating spacers, and the barriers bracings and other insulation used in the assembly of the windings shall be arranged to ensure a free circulation of the oil and to reduce hot spots in the windings
- 7.6.15 Coils should be transposed to minimize magnetic forces and extra supports shall provide for inter- disc connection.
- 7.6.16 All materials used in the insulation and assembly of the winding shall be new, insoluble, non-catalytic, and chemically inactive in the hot transformer oil, and shall not soften or otherwise be adversely affected under the operating conditions.
- 7.6.17 The current density of coil shall not exceed 2.4 Amps/ square mm at min tap of respective PTR's higher rating.
- 7.6.18 All threaded connections shall be provided with locking facilities. All leads from the winding to the terminal board and bushings shall be rigidly supported to prevent injury from vibration. Guide tubes shall be used where practicable.

7.7 Insulating paper and insulating press board

- 1. The bidder shall submit characteristics along with make for all the type of insulation papers and Pressboards to be used with the offer.**
2. Inter layer insulation both for HV and LV windings shall be Epoxy diamond dotted Kraft paper and compressed pressboard of reputed make (subject to approval of TPNODL).

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3. For Winding insulation, only Double Paper Covered insulation is acceptable with laying in opposite direction to each other and each paper must have overlapping more than 60% of its width.
4. Kraft paper and Pressboard should be made of pure Cellulose from soft wood pulp manufactured from sulphate process. No additive, adhesive or coloring matter shall be present.
5. Kraft paper and Pressboard should be of class A (105°C) insulation material.
6. All spacers, axial wedges / runners used in windings shall be made of pre-compressed solid pressboard.
7. All axial wedges/runners shall be properly milled to dovetail shape so that they pass through the designed spacers freely.
8. Insulation shearing, milling and punching operations shall be carried out in such a way, that there should not be any burr, sharp edges and dimensional variations.
9. Kraft paper self-adhesive tape to be used for bonding of insulating paper layer, spanner and paperboards that are immersed in the oil filled transformer.

Below required values could be verified if required at any stage of the inspection and it should fulfill the requirement as per below table:

Characteristics	Kraft Paper	Pressboard (all Sizes)
1. Dimension	As specified by bidder with $\pm 5\%$ tolerance.	As specified by bidder with tolerance as per IS1576.
2. Apparent Density	>0.80 g/cm ³	as per IS1576 w.r.t Thickness
3. pH of Aqueous extract	6-8%	6-8%
4. Electrical strength i) in air ii) In Oil	7KV/mm -----	12KV/mm 35KV/mm
5. Ash content	Maximum 1%	Maximum 0.7
6. Moisture content	Maximum 8%	Maximum 8%
7. Oil absorption	-----	Minimum 9%

Bidder has to submit the test certificates as per IS-9335, IS-1576 for all type of insulating materials covering above stated parameters along with below parameters during stage inspection:

1. Substance (Grammage) (g/m²)
2. Compressibility
3. Tensile strength
4. Conductivity of water extract
5. Shrinkage in air
6. Flexibility
7. Cohesion between plies1.
8. Elongation

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- 9. Air permeability
- 10. Tear index
- 11. Heat stability

7.8 INSULATING OIL

- 7.7.1 The insulating oil for the transformer shall be of EHV grade, generally conforming to IS: 335. No inhibitors shall be used in the oil.
- 7.7.2 The quantity of oil required for the first filling of the transformer and its full specification shall be stated in the bid. transformer shall supplied complete with all fittings, accessories and new transformer oil required for first filling plus 10% extra oil. The extra quantity of oil shall be supplied in non-returnable drums along with the oil required for the radiator banks.
- 7.7.3 The design and materials used in the construction of the transformer shall be such as to reduce the risk of the development of acidity in the oil.
- 7.7.4 The oil parameters shall be as per Table-1 of IS 335.

7.9 VALVES

- i) Valves shall be of forged carbon steel up to 50mm size and of gun metal or of cast iron bodies with gun metal fittings for sizes above 50mm. They shall be of full way type with screwed ends and shall be opened by turning counter clockwise when facing the hand wheel. There shall be no oil leakage when the valves are in closed position.

Each valve shall be provided with an indicator to show the open and closed positions and shall be provided with facility for padlocking in either open or closed position. All screwed valves shall be furnished with pipe plugs for protection. Padlocks with duplicate keys shall be supplied along with the valves.

- ii) All valves except screwed valves shall be provided with flanges having machined faced drilled to suit the applicable requirements, oil tight blanking plates shall be provided for each connection for use when any radiator is detached and for all valves opening to atmosphere. If any special radiator valve tools are required the contractor shall supply the same.
- iii) Each transformer shall be provided with following valves on the tank:
- a) Drain valve so located as to completely drain the tank & to be provided with locking arrangement.
 - b) Two filter valves on diagonally opposite corners of 50mm size & to be provided with locking arrangement.

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- c) Oil sampling valves not less than 8mm at top and bottom of main tank & to be provided with locking arrangement.
- d) One 15mm air release plug.
- e) Valves between radiators and tank. Drain and filter valves shall be suitable for applying vacuum as specified in the specifications.

7.10 ACCESSORIES

7.10.1 Bushing

- i) All porcelain used in bushings shall be homogeneous, non-porous, uniformly glazed to brown color and free from blisters, burns and other defects.
- ii) Stress due to expansion and contraction in any part of the bushing shall not lead to deterioration.
- iii) Bushing shall be designed and tested to comply with the applicable standards.
- iv) Bushing rated for 400A and above shall have non-ferrous flanges and hardware.
- v) Fittings made of steel or malleable iron shall be galvanized
- vi) Bushing shall be so located on the transformers that full flashover strength will be utilized. Minimum clearances as required for the BIL shall be realized between live parts and live parts to earthed structures.
- vii) All applicable routine and type tests certificates of the bushings shall be furnished for approval.
- viii) Bushing shall be supplied with bi-metallic terminal connector/ clamp/ washers suitable for fixing to bushing terminal and the Employers specified conductors. The connector/clamp shall be rated to carry the bushing rated current without exceeding a temperature rise of 550 Cover an ambient of 500 C. The connector/clamp shall be designed to be corona free at the maximum rated line to ground voltage.
- ix) Bushing of identical voltage rating shall be interchangeable.
- x) The insulation class of high voltage neutral bushing shall be properly coordinated with the insulation class of the neutral of the low voltage winding.
- xi) Each bushing shall be so coordinated with the transformer insulation that all flashover will occur outside the tank.
- xii) The extended bushing bus bars shall be used for termination of 11 KV cables. LV busing shall be housed in completely sealed metallic enclosure.
- xiii) Sheet steel, weather, vermin and dust proof cable box fitted with required glands, locks, glass door, terminal Board, heater with switch, illumination lamp with switch, water-tight hinged and padlocked door of a suitable construction shall be provided with each transformer to accommodate 11 KV cables etc. The box shall have slopping roof and the interior and exterior painting shall be in accordance with the specification. Padlock along with duplicate keys shall be supplied for marshaling box. The degree of protection shall be IP-55 or better. To prevent internal condensation, a metal clad heater with thermostat shall be provided. The heater shall

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be controlled by a MCB of suitable rating mounted in the box. The ventilation louvers, suitably padded with felt, shall also be provided. The louvers shall be provided with suitable felt pads to prevent ingress of dust. All incoming cables shall enter the kiosk from the bottom and the minimum 4mm thick, non-magnetic, gland plate shall not be less than 600 mm from the base of the box. The gland plate and associated compartment shall be sealed in suitable manner to prevent the ingress of moisture from the cable trench – **for those transformers which are used in partly indoor substation**, if required as per BOQ, a cable box for LV bushings shall be provided.

7.10.2 Protection & Measuring Devices

i) Oil Conservator Tank

- a) The Conservator tank shall have adequate capacity between highest and lowest visible levels to meet the requirement of expansion of the total cold oil volume in the transformer and cooling equipment.
- b) The conservator tank shall be bolted into position so that it can be removed for cleaning purposes.
- c) The conservator shall be fitted with magnetic oil level gauge with low level electrically insulated alarm contact.
- d) Plain conservator fitted with silica gel breather.

ii) Oil preserving equipment shall be conservator (expansion tank) type. The conservator shall have two filter valves, one at the bottom at one end, the other at the top, opposite end, in addition to the valve specified in the Accessories for the main tank. The conservator or expansion tank shall also have a shutoff valve and a small drain valve and sampling cock, the latter so arranged as not to interfere with oil lines. The oil level gauges (prismatic and magnetic) shall be mounted on the conservator or expansion tank. The top of the conservator shall have contact with atmosphere through two silica gel breathers to facilitate replacement of breather without having to keep Buchholz relay inoperative. The silica gel breathers shall have Polyurethane Type body & it should be transparent and UV protected.

iii) Conservator oil preservation bag (atmosphere bag) shall be provided with a design such that it can be installed at site with ease without any special tools and tackles. The price for COPS bag shall be clearly mentioned in the price schedule at the specified place. With COPS type conservator shall supply air or nitrogen filling arrangement with all accessories needed at the time of commission and pressure gauge arrangement shall be provided for monitoring COPS bag pressure.

iv) Proper valve arrangement (Two top valve & one bottom valve on conservator) is to be provided for proper oil filling.

v) Prismatic oil level indicators with red color float shall be provided on main tank and OLTC tank Conservator. Dual contacts are required for both MOGs (Main Tank & OLTC conservator).

Separate conservator tank shall be provided for OLTC. 120L tank shall be used for 66KV.

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vi) Pressure Relief Device.

The pressure relief device provided shall be of sufficient size for rapid release of any pressure that may be generated in the tank and which may result in damage of the equipment. The device shall operate at a static pressure of less than the hydraulic test pressure of transformer tank. It shall be mounted direct on the tank. A pair of electrically insulated contact shall be provided for alarm and tripping.

vii) Buchholz Relay

A double float type Buchholz relay shall be provided with reed switch. Any gas evolved in the transformer shall collect in this relay. The relay shall be provided with a test cock suitable for a flexible pipe connection for checking its operation. A copper tube shall be connected from the gas collector to a valve located about 1200 mm above ground level to facilitate sampling with the transformer in service. The device shall be provided with two electrically independent potential free contracts, one for alarm on gas accumulation and the other for tripping on sudden rise of pressure.

viii) Temperature Indicator

a) Oil Temperature Indicator (OTI)

The transformers shall be provided with a micro switch contact type thermometer with 150 mm dial for top oil temperature indication. The thermometer shall have adjustable, electrically independent potential free alarm and trip contacts. Maximum reading pointer and resetting device shall be mounted in the local control panel. A temperature sensing element suitably located in a pocket on top oil shall be furnished. This shall be connected to the OTI by means of capillary tubing. Accuracy class of OTI shall be $\pm 1\%$ or better. One No electrical contact capable of operating at 5 A ac at 230 volt supply.

b) Winding Temperature indicator (WTI)

A device for measuring the hot spot temperature of the winding shall be provided. It shall comprise the following.

- i) Temperature sensing element.
- ii) Image Coil.
- iii) Micro switch contacts.
- iv) Auxiliary CTS, if required to match the image coil, shall be furnished and mounted in the local control panel.
- v) 150mm dial local indicating instrument with maximum reading pointer mounted in local panel and with adjustable electrically independent ungrounded contacts, besides that required for control of cooling equipment, one for high winding temperature alarm and on for trip.

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vi) Two number electrical contact each capable of operating at 5 A ac at 230 Volt supply.

7.10.3 Oil Preservation Equipment

7.10.3.1 Oil Sealing

The oil preservation shall be diaphragm type oil sealing in conservator to prevent oxidation and contamination of oil due to contact with atmospheric moisture.

The conservator shall be fitted with a dehydrating filter breather. It shall be so designed that.

- i) Passage of air is through a dust filter & Silica gel.
- ii) Silica gel is isolate from atmosphere by an oil seal.
- iii) Moisture absorption indicated by a change in color of the crystals of the silica gel can be easily observed from a distance.
- iv) Breather is mounted not more than 1400 mm above rail top level.

7.11 MARSHALLING BOX

- i) Sheet steel, weather, vermin and dust proof marshaling box fitted with required glands, locks, glass door, terminal Board, heater with switch, illumination lamp with switch, water- tight hinged and padlocked door of a suitable construction shall be provided with each transformer to accommodate temperature indicators, terminal blocks etc. The box shall have slopping roof and the interior and exterior painting shall be in accordance with the specification. Padlock along with duplicate keys shall be supplied for marshaling box. The degree of protection shall be IP-55 or better.
- ii) The schematic diagram of the circuitry inside the marshaling box be prepared and fixed inside the door under a propone sheet.
- iii) The marshaling box shall accommodate the following equipment:
 - a) Temperature indicators.
 - b) Terminal blocks and gland plates for incoming and outgoing cables.

All the above equipment except c) shall be mounted on panels and back of panel wiring shall be used for inter-connection. The temperature indicators shall be so mounted that the dials are not more than 1600 mm from the ground level and the door(s) of the compartment(s) shall be provided with glazed window of adequate size. The transformer shall be erected on a plinth which shall be 2.5 feet above ground level.

- iv) To prevent internal condensation, a metal clad heater with thermostat shall be provided. The heater shall be controlled by a MCB of suitable rating mounted in the box. The ventilation louvers, suitably padded with felt, shall also be provided. The louvers shall be provided with

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suitable felt pads to prevent ingress of dust.

- v) All incoming cables shall enter the kiosk from the bottom and the gland plate shall not be less than 450 mm from the base of the box. The gland plate and associated compartment shall be sealed in suitable manner to prevent the ingress of moisture from the cable trench.

7.12 TAPCHANGER

7.12.1 OFF-LOAD TAP-CHANGERS(For 3.15 MVA transformers)

- i) The transformers shall be provided with Off-load Taps.
- ii) The Transformer with off-load tap changing gear shall have taps ranging from +5% to -15% in 8 equal steps of 2.5% each on HV winding for voltage variation.
- iii) The tap changing switch shall be located in a convenient position so that it can be operated from ground level. The switch handle shall be provided with locking arrangement along with tap position indication, thus enabling the switch to be locked in position.

7.12.2 ON-LOAD TAP-CHANGERS

- i) The 5/8/10 MVA transformers shall be provided with On-load Taps. Specification of OLTC is attached herewith as Annexure.
- ii) The Transformer with off-load tap changing gear shall have taps ranging from +5% to -15% in 9 equal steps of 2.5% each for Off Load Tap.
- iii) The tap changing switch shall be located in a convenient position so that it can be operated from ground level. The switch handle shall be provided with locking arrangement along with tap position indication, thus enabling the switch to be locked in position
- iv) The tapping range of On Load Tap Changer shall be +5% to -15% in steps of 1.25% each. The no of taps shall be 17. The On Load Tap Changer shall be supplied with RTCC panel and AVR (Automatic Voltage Regulating Relay)
- v) The Continuous current rating of the tap changer shall be based on connected winding rating and shall have liberal and ample margin. Lower rated tap changers connected in parallel are not acceptable.
- vi) The on-load tap changing equipment shall have the provision for mechanical and electrical control from a local position and electrical control from a remote position. For local mechanical operation, the operating handle shall be brought outside the tank for operation from floor level with provision to lock the handle in each tap position. Remote electrical operation shall have an AUTO-MANUAL selection at the remote location. When selected AUTO, the tap changing gear shall maintain steady voltage within practical limit on the transformers secondary bus from which the reference shall not respond to transient variation of voltage due to grid disturbance and system fault.
- vii) The required voltage relay shall not be sensitive to frequency variation and shall be suitable

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for sensing voltage from the secondary of potential transformers mounted on the 33KV, or 11KV bus.

- viii) The tap changer shall be provided with over-current protection in order to prevent the tap-change operation during a short circuit, which would to greatly stress the contacts of the diverter switch. The function of protection shall be arranged as follows;
- (i) Whenever over current occurs, the control circuit for commanding OLTC motor operation shall be blocked by the normally close contracts of the over current relays.
 - (ii) If during tap change over current occurs, the OLTC motor circuit shall be blocked through the mechanical cam switch, which is close from the very beginning to the very end of every tap change operation and to the normally open contacts of the over current relays. The stop action of the motor shall be made through the motor brake contactor.
- ix) The design of the tap changing equipment shall be such that the mechanism will not stop in any intermediate position; however, if the mechanism through faulty operation does stop in an intermediate position, the full load must be carried by the transformer without injury to the equipment. The mechanical position indicator shall be equipped in the motor drive cubicle. The motor shall be designed to be of step control. In any case the operation shall be of step by step.
- x) The voltage regulating relay shall be supplied together with the timer and under voltage relay. The signal order from the voltage regulating relay to execute the tap changer operation, when the regulating voltage is out of the voltage regulating level shall be designed to be delayed by the adjustable timer. If the control voltage abnormally falls, the movement of the tap changer shall be locked by the contact of the under voltage relay, even if the contacts of the voltage regulating relay are working.
- xi) The control circuit of the transformer shall be completely designed and provisions shall be made for parallel operation with another transformer.
- xii) The following accessories, control and selector switches and other necessary accessories shall be furnished.

Remote tap changer control board

(Placed in the control room)

- Voltmeter
- "AUTO-MANUAL" control switch
- "RAISE-LOWER" control switch
- Tap position indicator
- Tap changer operation program indicator.

Transformer Tap Changer driving mechanism control cubicle

- "REMOTE-LOCAL-TEST" selector switch

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- “AUTOMATIC-MANUAL” control switch
- “RAISE-LOWER” control switch
- Tap position indicator
- Tap changer operation program indicator
- Voltmeter
- Tap change operation counter
- Means for manual operation when power supply is lost

1. OLTC shall have the entire feature to meet the requirement. The equipment shall conform to the latest applicable Indian standard / IEC standard. Equipment complying with any other authoritative standards such as British, VDE etc. shall also be considered if offered.
2. The OLTC gear shall be designed to complete successfully tap changes for the maximum current to which transformer can be loaded i.e. 120% of the rated current. Devices shall be incorporated to prevent tap change when the through current is in excess of the safe current that the tap changer can handle. The OLTC gear shall withstand through fault currents without injury.
3. When a tap change has been commenced it shall be completed independently of the operation of the control relays and switches. Necessary safeguards shall be provided to allow for failure of auxiliary power supply or any other contingency which may result in the tap changer movement not being completed once it is commenced.
4. OLTC shall be a separate compartment & should be external to transformer tank. Oil in compartments which contain the making and breaking contacts of the OLTC shall not mix with oil in other compartments of the OLTC or with transformer oil. Gases released from these compartments shall be conveyed by a pipe to a separate oil conservator or to a segregated compartment within the main transformer conservator. A OSR with shut off valves and MOG shall be installed between OLTC and conservator tank. The OLTC conservator shall be provided with prismatic oil level gauges with red color float. The length and alignment of the MOG and OSR pipe shall be such that, the transformer does not trip by the vibration of the pipe.
5. Oil in compartments of OLTC which do not contain the make and break contacts, shall be maintained under conservator head through valve pipe connections. Any gas leaving these compartments shall pass through the OSR relay before entering the conservator. The cable entry of OSR should be from bottom end instead from side
6. Oil filled compartments shall be provided with filling plug, drain valve with plug, air release vent, oil sampling device, inspection opening with gasket and bolted cover with lifting handles.
7. The OLTC motor shall be provided with 415 V auto changeover facilities. For the control of OLTC, Tap change control relay (A-Eberle make) shall be provided by purchaser. Tap position indication along with the various alarms of tap changer shall be indicated in the marshaling box.
8. Separate OLTC tank should be provided at a height lower than that of the main conservator tank so that the same is easily accessible for maintenance.

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9. OLTC driving mechanism and its associated control equipment shall be mounted in an outdoor, weather proof cabinet, which shall include:
- Driving motor (415 V - 3 phase, 50 Hz, AC squirrel cage)
 - Motor starting contactor with thermal overload relays, isolating switch and HRC fuses.
 - Duplicate sources of power supply with automatic changeover from the running source to the standby source and vice versa.
 - End Limit Switch shall be provided to prevent operation beyond extreme taps & Contacts shall be provided for operation through SCADA.
 - Limit switch to cut off electrical operation on insertion of manual handle (Contacts shall be provided for operation through SCADA).
 - Local/Remote selector switches shall be provided with status indication.
 - Control switch: Raise/off/lower (spring return to normal type). (Contacts shall be provided for operation through SCADA).
 - Remote/local selector switch (maintained contact type). (Contacts shall be provided for operation through SCADA).
 - Mechanical tap position indicator showing rated tap voltage against each position and resettable maximum and minimum indicators.
 - Limit switches to prevent motor over travel in either direction & final mechanical stops.
 - Brake or clutches to permit only one tap change at a time on manual operation.
 - Emergency manual operating device (hand crank or hand wheel).
 - Electrically interlocked reversing contactors (preferably also mechanically interlocked).
 - 240V, 50 HZ, AC space heaters with switch and MCB.
 - Interior lighting fixture with lamp door switch and MCB.
 - Gasketed and hinged door with locking arrangement.
 - Terminal blocks, internal wiring, earthing terminals and cable glands for power and control cables.
 - Necessary relays, contactors, current transformers etc.
 - Thermal device or other means shall be provided to protect the motor and control circuit. All relays, switches, fuses etc. shall be mounted in local OLTC control cabinet and shall be clearly marked for the purpose of identification.
 - A five digit counter shall be fitted to the tap changing equipment to indicate the number of operation completed.
 - The equipment shall be suitable for supervisory control and indication with make before break multi-way switch, having one potential free contact for each tap position. This switch shall be provided in addition to any other switch/switches which may be required for remote tap position indication.'
 - Operation from the local or remote control switch shall cause one tap movement only until the control switch is returned to the off position between successive operations.
 - OLTC shall be provided with PRV.

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- Suitable manholes covers should be provided on the sidewalls to give access to the selector switches of the OLTC. There should be ample access for opening /Reconnecting tap-leads to the OLTC from all sides.
- Suitable valves shall be provided to take sample of oil from the OLTC chamber during operation of the transformer.

10. Control Requirements for OLTC-

The following electrical control features shall be provided:

- Positive completion of load current transfer, once a tap change has been initiated, without stopping on any intermediate position, even in case of failure of external power supply.
- Only one tap change from each tap change impulse even if the control switches or push button is maintained in the operated position.
- Cut-off of electrical control when manual control is resorted to. It shall not be possible to operate the electric drive when the manual operating gear is in the use.
- Cut-off of a counter impulse for a reverse tap change until the mechanism comes to rest and resets the circuits for a fresh operation.
- Cut-off of electrical control when it tends to operate the tap beyond its extreme position. Mechanical limit switches shall be provided for this purpose to achieve suitable interlocking.

11. Automatic / Parallel Operation with OLTC

OLTC shall be able to do automatic / parallel operations through Transformer Monitoring Unit (TMU).

12. Alarms-

The following alarms shall be provided with the additional contact arrangement for connection to SCADA.

- End Limit Switch
- Manual Operation Insertion
- A.C. supply failure
- Drive motor autotripped
- Tap Stuck up change delayed
- OSR trip
- MOG Alarms
- PRV Trip
- TC in Progress.
- Any other protective feature, if considered essential by the Bidder.

13. Tap Changer Control and Transformer Monitoring Unit (TMU) is not to be supplied by the bidder of the Transformer.

14. Auxiliary Power Supply of OLTC, Cooler Control and Power Circuit :

- Two auxiliary power supplies, 415 volt, three phase four wire shall be provided by the Purchaser for OLTC and power circuit.

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- ii. All loads shall be fed by one of the two feeders through an electrically interlocked automatic transfer switch housed in the marshalling box for on load tap changer control and cooler circuits.
- iii. Design features of the transfer switch shall include the following:
 - a) Provision for the selection of one of the feeder as normal source and other as standby.
 - b) Upon failure of the normal source, the load shall be automatically transferred after an adjustable time delay to standby sources.
 - c) Indication to be provided at marshalling box for failure of normal source and for transfer to standby source and also for failure to transfer.
 - d) Automatic re-transfer to normal source without any intentional time delay following re-energization of the normal source.
 - e) Both the transfer and the re-transfers shall be dead transfers and AC feeders shall not be paralleled at any time.

15. Manual Control

The cranking device for manual operation of the OLTC gear shall be removable and suitable for operation by a man standing at ground level.

The mechanism shall be complete with the following :

- a) Mechanical tap position indicator which shall be clearly visible from near the transformer.
- b) A mechanical operation counter.
- c) Mechanical stops to prevent over-cranking of the mechanism beyond the extreme tap positions.
- d) The manual control considered as back up to the motor operated load tap changer control shall be interlocked with the motor to block motor start-up during manual operation. The manual operating mechanism shall be able to show the direction of operation for raising the HV terminal voltage and vice-versa.

- 1. Bushings provided by the bidder shall be as per IS2099-1986. The bushings shall have high factors of safety against leakage to ground and shall be so located as to provide adequate electrical clearance between bushings and grounded parts. Bushings of identical voltage rating shall be interchangeable. All bushings shall be equipped with suitable terminals of approved type and size and all external current carrying contact surfaces shall be plated, adequately. The insulation class of the high voltage neutral bushing shall be properly co-ordinate with the insulation class of the neutral of the high voltage winding.
- 2. All main winding leads shall be brought out through outdoor type bushings as specified which shall be so located that the full flashover strength will be utilized and the adequate phase clearance shall be realized.
- 3. Each bushing shall be so coordinated with the transformer insulation that all flash-over will occur outside the tank.
- 4. All porcelain used in bushings shall be of the wet process, homogeneous and free from cavities or other flaws. The insulation (porcelain) shall be without any joint up to 145kV class. The glazing shall be uniform in colour and free from blisters, burns and other defects. Stresses due to expansion and contraction in any part of the bushing shall not lead to deterioration.

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5. All oil filled bushing shall be provided with prismatic type oil gauge with red colored float inside the gauge for oil level indication. The oil gauge glass shall be so designed that it shall give satisfactory service (without melting/cracking or bulging) at specified site conditions, throughout the life of transformer/bushing. It shall not turn opaque during the service.
6. In case of oil communicating type bushing (for 33 KV & 11 KV), venting screw of the hollow stud, shall be provided with Teflon gaskets, to avoid oil leakage problem through the same. Angle of inclination to vertical for any bushing shall not exceed 30 deg. All bushings shall have puncture strength greater than the dry flash-over value.
7. Main terminals shall be solder less terminals, and shall be of the type and size specified in the drawings. The spacing between the bushings must be adequate to prevent flashover between phases under all conditions of operation.
8. The Bidder shall give the guaranteed withstand voltages for the above and also furnish a calibration curve with different settings of the co-ordination gap, to the purchaser to decide the actual gap setting. Bidder's recommendations are also invited in this respect.
9. The following routine tests shall be carried out on all bushings in the presence of purchaser's representative, in addition to any other specified in the IS:
 - a) Visual examination
 - b) One minute dry withstand test
 - c) Oil tightness test
10. The bushings shall have a link type isolating facility for tap for maintenance tests viz. power factor measurement etc. (Terminal shall be provided for the measurement of power factor and tan delta).

7.13.2 Gaskets

1. All bolted connection to the tank shall be fitted with suitable oil-tight gaskets which shall give satisfactory service under the operating conditions. Gaskets shall be of rubber/Nitrate.
2. Special attention shall be given to the methods of making the oil-tight joints between the tank and the cover as also between the cover and the bushings and all other outlets to ensure that the joints can be remade satisfactorily and with ease, with the help of semi-skilled labor.
3. Where compressible gaskets are used, steps shall be provided to prevent over compression.
4. All the bolts provided shall be of hot dip galvanized.
5. All bolts shall be provided with one spring washer and two numbers of flat washers and with locking bolts.

All gasket joints shall be provided with equalizing links to extend earth connections.

7.13.3 Radiators

1. The radiators of cooler units shall be epoxy painted the entire surface including edges should be cleaned properly before painting to avoid peeling of paint at the edges.
2. Radiators shall be metal spray painted.

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3. Bidder shall submit procedure for surface preparation and painting/galvanizing of radiators along with the bid.
4. Price for galvanized radiators shall be quoted separately.
5. The color shade for the radiator shall be shade 631 as per IS: 5.
6. Tank mounted radiators/coolers shall be of the detachable type with bolted and gasketed flanged connections.
7. The following accessories shall be provided for radiator:
 - a) Shut off valves and blanking plates on transformer tank at each point of connection.
 - b) Top and bottom shut off valves and blanking plates on each radiator.
 - c) Lifting lugs
 - d) Top oil filling plug.
 - e) Air release plug at top.
 - f) Oil drain plug at bottom.
 - g) Top oil filling pump.
8. All radiators shall be tested for:
 - a) Vacuum test for one hour
 - b) Hydraulic pressure test using transformer oil for one and half hour (as per ASME)
 - c) Air test can be done in place of hydraulic pressure test provided.
 - d) Water tank will be made available for submerging the radiators into water for leak detection.
 - e) All the tests shall be done in black condition (i.e. before applying any paint).
9. The transformer design shall be such that the radiators and conservator can be mounted on either side of the tank.

7.13.4 Cooling equipment and its control

1. Expansion joint shall be provided, one each on top and bottom cooler pipe connections. Air release device and oil plug shall be provided on oil pipe connections..
2. Drain valves shall be provided in order that each section of pipe work can be drained independently
3. Anodized aluminum plate showing details of all terminals nos. & drawing shall be provided along with marshalling box.
4. Wiring from the current transformers and other control and alarm equipment shall be carried out in conduits or alternatively in concealed trays and terminated in marshalling box.
5. All terminal blocks for WTI, OTI etc. shall be of disconnecting type. Terminal blocks for short circuiting the current transformer shall be provided separate from the terminal blocks accommodating the control and indicating circuits. The direct and alternating current terminals shall be isolated from each other.
6. All tapings of all CTs shall be brought to terminals in the marshalling box. The terminals for the current transformer leads shall be suitable for accommodating , 6 sq.mm cable leads, with disconnecting type

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links, while the terminals for the control and other circuits shall be suitable for accommodating 4 sq.mm. cable leads. All wires shall be stranded copper, 1.1kV grade insulation, fire resistant and shall be of reputed make. A minimum of ten spare terminals for control wiring shall be provided.

7. Suitably rated switches shall be provided to enable the control supply to the transformer to be cut off from the cabinet.
8. Enough Space shall be provided at the bottom of the operating cabinet to mount the Purchaser's control cables double compression type glands. The number and size of the cable glands shall be intimated later. All terminal blocks for control shall be rated for 10 Amps.
9. Wire and cable bunching rods shall be provided on all terminal blocks on either side. The wire terminals shall be engraved or otherwise indelibly marked ferrules and the wires shall be color coded.
10. All terminal blocks shall have terminal nos. on either side of terminals.
11. Stud type fuse mounts shall be provided with an insulating cover as protection against accidental contact with live terminals.
12. Drawing pouch with cooler control scheme drawings and TB Schedule covered in the polythene paper shall be provided inside marshalling box on the door.
13. Additional 230V, 15 Amps, 3 pin plug point shall be provided for testing purposes inside the marshalling box.
14. A suitably rated light point with its associated control switches shall be provided inside the housing for use in emergency.
15. All alarm and control devices shall be ungrounded.
16. Bidder shall furnish a list of the relays, control switches, timers, and other accessories like Bidder, bushing, MOG etc. indicating the make, type, auxiliary supply requirements, contact rating etc. along with quotation.
17. The make of devices shall be subject to approval by purchaser, after finalization of order. The bidder shall furnish O & M manual for all the auxiliary equipment's.
18. A single metal-enclosed main isolating switch, with HRC fuses, shall be provided for the cooling plant.
19. The contactors, starters and relays provided in the marshalling box shall be reputed make such as Siemens, L&T, ABB or equivalent make as per purchaser's approval.
20. The switching in or out of the cooling equipment shall be controlled by winding/oil temperature and there shall be provided for automatic switching in or out at predetermined temperature levels which should be capable of adjustment in settings.
21. The local mechanical indication scheme for all annunciation shall be provided in the marshalling box with mechanical target relays/contactors.
22. The following alarm indication shall be provided each with 2NO contacts.
 - i. Failure of power supply/control supply.
 - ii. Conservator oil level low (MOG)/ Oil Level High
 - iii. PRD Trip./PRV TRIP
 - iv. Buchholz relay trip/alarm.

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- v. Winding Temperature high.
- vi. Winding Temperature high-high.
- vii. Oil Temperature high.
- viii. Oil Temperature high-high.
- ix. Buchholz/OSR of OLTC trip
- x. OLTC oil level low / OLTC oil level high SPR Trip

7.13.5 Indicating devices

Following lamp indications shall be provided in Marshalling Box:

- a) Control Supply failure.
- b) Common thermal overload trip.
- c) One potential free initiating contact for all the above conditions shall be wired independently to the terminal blocks of marshalling box cabinet

7.13.6 Valves

1. All valves up to and including 100 mm shall be of gun metal or of cast steel. Larger valves may be of gun metal or may have cast iron bodies with gun metal fittings. They shall be of full way type with internal screw and shall open when turned counter clock wise when facing the hand wheel.
2. Suitable means shall be provided for locking the valves in the open and close positions. Provision is not required for locking individual radiator valves.
3. Each valve shall be provided with the indicator to show clearly the position of the valve.
4. All valves flanges shall have machined faces.
5. All valves in oil line shall be suitable for continuous operation with transformer oil at 100°C.
6. The oil sampling point for main tank shall have two identical valves to be put in series. Oil sampling valve shall have provision to fix rubber hose of 10 mm size to facilitate oil sampling.
7. A valve or other suitable means shall be provided to fix the on line dissolved gas monitoring system to facilitate continuous dissolved gas analysis. The location & size of the same shall be finalized during detail engineering stage.
8. After testing, inside surface of all cast iron valves coming in contact with oil shall be applied with one coat of oil resisting paint/varnish with two coats of red oxide zinc chromate primer followed by two coats of fully glossy finishing paint conforming to IS: 2932 and of a shade (preferably red or yellow) distinct and different from that of main tank surface.
9. Outside surface except gasket setting surface of butterfly valves shall be painted with two coats of red oxide zinc chromate conforming to IS: 2074 followed by two coats of fully glossy finishing paint.

All hardware used shall be cadmium plated/electro galvanized

7.13.7 Insulation

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1. The dielectric strength of the winding insulation and of the bushings shall conform to the values given in IS 2026 (latest version).
2. For rated system voltage 36 the following impulse test voltage shall be offered. System voltage : 12 KV, 36KV, Impulse Test Voltage: 75 kV, 170KV,
3. The transformer shall be capable of operating continuously at its normal rating without exceeding temperature limits as specified below:

	Type of cooling	Temperature rise
Winding	Natural-oil Natural-air cooled (ONAN)	55 deg.C
Oil	All types	45 deg.C

7.13 FITTINGS AND ACCESSORIES

The following fittings and accessories shall be provided on the transformers:

- i) Conservator with isolating valves, oil filling hole with cap and drain valve. The conservator vessel shall be filled with constant oil pressure diaphragm oil sealing system.
1. Magnetic type oil level gauge (150 mm dia.) with low oil level alarm contacts. **One magnetic- type oil-level gauge** each in Main Tank and OLTC Tank with low and high level alarm contacts for main tank MOG and low level alarm for OLTC tank MOG and a dial showing minimum, maximum and normal oil levels. The gauge shall be readable from the transformer base level. It should have cable disconnecting facility at top of MOG, to facilitate testing of MOG. Along with MOG, prismatic type oil level indicator (glass window) shall also be provided on conservator.

MOG technical parameters should be according to the below mentioned specifications.

General Technical Requirements for MOG:			
S No	DESCRIPTION	UNITS	
1	Mounting Pad Diameter	Mm	150
2	Electric Switch		Two no's Micro Switches
3	Contact Rating		5 Amps 240V AC, 0.25 Amp 24V DC.
4	Switch Operation		Normally open, closes when oil level drops to near empty condition. Switch recovers automatically on rising of oil level
5	Mounting of indicator		Vertical

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6	Dial Marking		Maximum, Minimum, 1/4, 1/2 & 3/4
7	Movement of float Arm		In the plane perpendicular to seating face
8	Conservator Dia	mm	900 mm
9	Air cell in conservator		Yes
10	Switches for		Low Oil level Alarm, High oil level Alarm.
11	Color		Black marking with white/yellow background.
12	Readable from Transformer base level		Yes
13	Cable disconnecting facility at top of MOG to facilitate testing of MOG		Yes
14	Mechanical Protection degree		IP55
15	Suitable for transformer rating	MVA	
16	Packing		Supplier shall ensure that the equipment covered by this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner so as to protect the equipment from damage in transit.
17	Marking		The unit shall be appropriately marked as "PROPERTY OF TPNODL, BERHAMPUR" and with the name of the vendor, Manufacturer type/serial no. , and year of manufacturing at suitable location.
18	Warranty		2 years from the date of purchase. In case any defects are found, the vendor shall replace the product free of cost.
19	Test Reports		Test certificates to be provided : 1) Specified levels. 2) Switch operation

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			3) HV Test 4) Leakage Test 5) Insulation Test
20	Acceptance test		Following tests shall be carried out: 1) Specified levels 2) Switch operation 3) HV Test 4) Leakage Test 5) Insulation Test

2. One oil filling valve (inlet)
 3. One oil drain valve
 4. One filter valve located at the top of the tank on the HV side.
 5. Oil sampling valves.
- ii) Prismatic/ toughened glass oil level gauge.
- iii) Silica gel breather with oil seal and connecting pipe complete with first fill of activated silica gel or Alumina mounted at a level of 1300 mm above ground level.
- iv) **One double float gas detector relay (Buchholz relay)** with alarm and tripping contacts to detect accumulation of gas and sudden changes of oil pressure complete with shut off valves between Relay and Conservator Tank flange-couplings to permit easy removal without lowering oil level in the main tank, a bleed valve for gas venting and test valve. The installation shall be weather proof to avoid any water seepage inside the relay. The cable entry should be from bottom end of Buchholz relay instead from side.
- v) **Buchholz relays:** should be according to the following general technical parameters as mentioned in below table.

S. No.	Description	Unit	Requirements
1	Type of relay		Magnetic reed switch type Buchholz relays suitable for nominal pipe bore of 80 mm with 2 sets of potential free contacts suitable for 24V to 48V DC.
2	No. of Switching systems		2
3	Suitable for Transformer Rating	MVA	above 10

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4	Nominal Pipe Bore	mm	80
5	Type of Flange		Round
6	Diameter of flange	mm	185
7	Diameter of bolt circle	mm	145
8	Number of the bolts		4
9	Size of the bolts		M16
10	Flange Thickness	mm	16
11	Surge Test (TRIP)	cm/s	90 to 160
12	Gas Volume (ALARM)	cc	200 to 300
13	Velocity Test	cm/s	90 to 160
14	Relay operating Temperature	range: Oil	10°C to 100°C
15	Relay operating Viscosity	range: Oil	65 to 75 centistokes at 10°C, 2 to 3.5 centistokes at 100°C
16	Element Test		With oil, at 1.75Kg/cm ² for 15 minutes,
17	High Voltage Test		Shall be able to withstand 2000 V at 50 Hz for 1 minute
18	Insulation Resistance Test		Shall be Greater than 10 Mega ohms with 500 V megger
19	Porosity Test		With oil, at 1.5 kg/cm ² for 4 hours - There shall not be any leakage or mechanical damage
20	Mechanical Strength Test		With oil at 8 kg/cm ² for 1 minute
21	Resistance of the Switch		Not to exceed 0.1 ohm across the electrodes of magnetic switch
22	Cable entry in terminal box		From bottom side

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vi) Pressure relief devices (including pressure relief valve) and necessary air equalizer connection between this and the conservator with necessary alarm and trip contacts. Pressure relief device

- a). Spring-loaded Pressure Relief Device (PRV) with mechanical flag indicator shall be provided on the main tank top of the transformer.
- b). Oil splashguard along with draining arrangement (with wire net on both side) up to ground level to be provided for prevention of oil splashing.
- c). Arrangement for air-release through a gate valve should be provided at the base of the PRV.
- d). The PRV shall not be located in the vicinity of the Marshalling Box or OLTC Box for safety of operating personnel.
- e). A pair of potential free contacts shall be provided to trip the transformer on action of the pressure relief device.
- f). It shall have the limit switch with 2NO and 2NC contacts, flag, switch operated rod etc.
- g). PRV shall be tested for all the applicable test such as Leakage Test, Switch operation, break down test.

vii) Air release plugs in the top cover.

- viii) Inspection cover, access holes with bolted covers for access to inner ends of bushing etc.
- ix) Winding temperature (hot spot) indicating device for local mounting complete in all respects. Winding Temperature Indicator (WTI) in one winding of each phase as described below:
 - a) It shall be indicating type, responsive to the combination of top oil temperature and winding current, calibrated to follow the hottest spot temperature of the transformer winding.
 - b) The winding temperature detector shall operate a remote alarm in the event the hottest spot temperature approaches a dangerous level and in the case of ONAN (Oil Natural and Air Natural) Thus WTI shall have 4 independent NO contacts for alarm and trip and cooler control.
- x) Equipment for remote winding and oil temperature Indicators including these to be installed in the Purchaser's control room shall be provided. Pocket with heater coil and CT for RTD for winding hot spots shall be provided.
- xi) **For purpose of remote recording and data acquisition system** Top oil temperature detector along with suitable transducer and other necessary devices to provide two sets of 4-20 mA signals with PT- 100 type of sensors. Winding temperature indicator shall have two set of contacts to operate at different settings :
 - a) To provide winding temperature high alarm
 - b) To provide temperature too high trip
- xii) Dial thermometer with pocket for oil temperature indicator with one set of alarm and one set of trip contacts and maximum reading pointer.
- xiii) Lifting eyes or lugs for the top cover, core and coils and for the complete transformer.
- xiv) Jacking pads
- xv) Haulage lugs.
- xvi) Protected type mercury / alcohol in glass thermometer and a pocket to house the same.

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- xvii) Top and bottom filter valves on diagonally opposite ends with pad locking arrangement on both valves.
- xviii) Top and bottom sampling valves.
- xix) Drain valve with pad locking arrangement
- xx) Rating and connection diagram plate.
- xxi) Two numbers tank earthing terminals with associated nuts and bolts for connections to Employer's grounding strip.
- xxii) Marshaling Box (MB)
- xxiii) Shut off valve on both sides of flexible pipe connections between radiator bank and transformer tank.
- xxiv) Cooling Accessories :
 - a) Requisite number of radiators provided with :-
 - One shut off valve on top
 - One shut off valve at bottom
 - Air release device on top
 - Drain and sampling device at bottom
 - Lifting lugs.
 - b) Air release device and oil drain plug on oil pipe connectors:
- xxv) Terminal marking plates for Current Transformer and Main Transformer
- xxvi) On Load Tap changer as per BOQ
- xxvii) Oil Preservation Equipment
 1. Oil Temperature indicator. A dial-type indicating thermometer of robust pattern mounted on the side of the transformer at a convenient height to read the temperature in the hottest part of the oil and fitted with alarm and trip contacts and contacts for switching in and switching out the cooling system at predetermined temperatures.
 2. Tap changer indicator of OLTC along with suitable transducer and other necessary devices to provide two sets of 4-20 mA signals along with one set of 1-16K resistance output shall be provided.
 3. All digital outputs for remote annunciation/control/DAS shall be provided with two changeover (NO) contacts for alarm condition and two changeover (NO) contacts for trip condition. The OTI & WTI shall be provided with micro switches, instead of mercury switches for alarm and trip purpose. All the interconnected wiring between TJB, Marshaling box and OLTC etc. shall be done by the bidder and schematics drawings of the same shall be supplied.
 4. **Oil Surge Relay** should be according to the following general technical parameters as mentioned in below table.

S. No.	Description	Unit	Requirements
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1	Type of relay		Magnetic reed switch type OSR suitable for 25 mm nominal pipe bore with 1 set of potential free contact to be used for 24 to 48V
2	No. of Switching systems		1
3	Suitable for		OLTC
4	Nominal Pipe Bore	mm	25
5	Type of Flange		Square
6	Diameter of flange	mm	78 square
7	Diameter of bolt circle	mm	72
8	Number of the bolts		4
9	Size of the bolts		M10
10	Flange Thickness	mm	6 mm
11	Surge Test (TRIP)	cm/s	70 to 130
12	Velocity Test	cm/s	70 to 130
13	Relay operating range: Oil Temperature		10°C to 100°C
14	Relay operating range: Oil Viscosity		66 to 75 centistokes at 10°C, 2 to 3.5 centistokes at 100°C
15	Element Test		With oil, at 1.75Kg/cm ² for 15 minutes,
16	High Voltage Test		Shall be able to withstand 2000 V at 50 Hz for 1 minute
17	Insulation Resistance Test		Shall be Greater than 10 Mega ohms with 500 V megger
18	Porosity Test		With oil, at 1.5 kg/cm ² for 4 hours - There shall not be any leakage or mechanical damage
19	Mechanical Strength Test		With oil at 8 kg/cm ² for 1 minute

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20	Resistance of the Switch		Not to exceed 0.1 ohm across the electrodes of magnetic switch
22	Cable entry in terminal box		From bottom side

- xxviii) Transformer shall be supplied with all control cable, WTI & OTI, sensing cable, glands, lugs etc (complete control).
- xxix) Oil Preserving Equipment
- xxx) Eye bolts and lugs on all parts for ease of handling.
- xxxii) Two grounding terminals.
- xxxii) Diagram and rating plate.
- xxxiii) One set of equipment for control, protection, indication and annunciation for each transformer comprising motor contactors, detecting elements or devices, indicating apparatus instruments, relay, annunciators, etc.
- xxxiv) Separate tank mounted marshalling box for terminal blocks for current transformer secondary only with Cable conduits for cables from devices to marshalling box.
- xxxv) Provision shall be made for installing resistance temperature detectors for temperature recording instruments arranged separately for the following:
 - a) Hot oil
 - b) Winding hot spot
- xxxvi) Two silica gel breathers (more than 5kg) each of 100% capacity for main tank.
- xxxvii) Ladder with ant-climbing arrangement and lock. Ladder should mount on side of transformer and not on HV/ LV side bushing.
- xxxviii) Inspection covers for transformer inspections on all phases (on vertical plane)
- xxxix) The equipment and accessories furnished with the transformer shall be suitably mounted on the transformer for ease of operation, inspection and maintenance, and the mounting details shall be subject to the approval of the purchaser. All valves shall be provided either with blind companion flanges or with pipe plugs, for protection. All valves shall have open/close position clearly marked.

Indication, alarm and relay equipment shall have contacts suitable for operation with 24/48V Volts DC supply. Any other accessories or appliances recommended by the Bidder for the satisfactory operation of the transformers shall be supplied

Note:

1. The fittings listed above are indicative and any other fittings which are generally required for satisfactory operation of the transformer are deemed to be included in the quoted price of the transformer.
2. The contacts of various devices required for alarm and trip shall be potential free and shall be

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adequately rated for continuous, making and breaking current duties as specified.

ANTI RUSTING/ CORROSION TREATMENT

1. The bidder shall ensure that all fabrication i.e. transformer tank, radiators, marshalling boxes and other accessories are treated for highest quality performance for the entire life of the transformer. The Bidder shall submit plan for extra measures he is taking for prevention of corrosion, along with the offer.
2. Finishes on transformer and appurtenant parts, edges (exposed to atmosphere)
3. NO GAS CUT EDGE OR SURFACE shall be acceptable unless smoothly ground to plane surface without irregular projections and corners (which cannot be blasted to the required roughness).
4. For all radiators the following painting procedure shall be followed. The metal spray (99.95% assay zinc) to a thickness about 100 microns with surface roughening and two coats of paints with proper supervision and quality checks. Bidder shall indicate separate price for metal spray of radiators.
5. In this corrosion prevention measure it is imperative that the job is fully monitored for optimizing the proper conduct of the procedure as given in the various national standards. The coating shall be as per BS: 2569 (latest revision). The coating requirement shall be to BS: 5493 Gr. SC10Z.
6. The Bidder shall submit a Quality Plan, giving the parameters and checking methods, (major, critical, minor).
7. The paint shade used shall be shade 631 as per IS: 5.

The following shall be the check points for the metal spray of Radiators:-

- a) Metal Spray
- b) Surface preparation
- c) Chemical analysis of actual material used for spray (batch wise identification).
- d) Coating Process (the first trial job will be witnessed to see if the written procedure is followed).
- e) Coating thickness test, adhesion test as per BS.
- f) Repair area classification major or minor and accordingly the repair from blasting onwards otherwise.

Bidder may quote for galvanized radiators instead of metal spray radiators as an alternative.

Centre of Gravity

The center of gravity of the assembled transformer shall be low and as near the vertical center line as possible. The transformer shall be stable with or without oil. If the center of gravity is eccentric relative to track either with or without oil, its location shall be shown on the outline drawing.

CENTRAL LINE MARKING

Central line of the transformer, tank, cooler bank, cable box etc. shall be marked properly with indication to avoid any confusion during installation of the transformer

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Painting

1. Before painting, surface preparation shall be done by sand blasting and procedure for sand blasting has to be submitted by the Vendor along with the bid. The surface preparation for all external surface prior to painting or coating shall be witnessed by customer or shall be treated as customer hold points. After sand blasting at all edges Belzona E metal to be applied.
2. Before shipment all steelwork not under oil shall be painted with a primary coat of anti-corrosive paint of durable nature and two coats of battleship grey paint (Shade 631 of IS: 5). Paint shall be epoxy type. The interior surfaces shall be painted as per bidder's standard practice. All the paint including primer shall be applied after testing such as air test, hydraulic test etc. Bidder shall submit their procedure for painting for Purchaser's approval, along with the offer.
3. Painting of Marshalling box: Two coats of red oxide primer & two coats of synthetic enameled paint after chemical treatment.
4. Metal parts not accessible for painting shall be made of corrosion resistant material.
5. Paint shall be as per Indian Standard/International Standard for quality, surface preparation, application method, thickness check and any other test.

Additional paint shall be supplied along with the transformer for applying touch up paint at site during installation. The shade of the paint used shall be shade 631 as per IS: 5

NITROGEN INJECTION DRAIN AND STIR SYSTEM

1. Fire prevention and extinguishing system shall work on the oil drain, nitrogen injection and stir method. The system shall operate during internal fault in transformer or external fire on transformer, which includes fire due to bursting of transformer bushing and Fire in OLTC tank.
2. Fire detector provided on the transformer shall take minimum time for detection of fire and initiate the fire protection system on receipt of other required signals.
3. System shall operate on station's DC auxiliary supply (24/48 VDC). The system shall be capable of working in Auto/Remote Electrical/Local manual modes.
4. Provision shall be available to keep the system "ISOLATED" / "OUT OF SERVICE" which is necessary for preventing any mal-operation during transformer maintenance.
5. The protection system shall be compatible of being hooked on to the SCADA or fire alarm system. Suitable spare contacts shall be made available for operation of fire system. System using PLC shall be only considered.
6. Fire protection system shall operate in Auto mode under two logic:
 - a. In Transformer Explosion prevention Logic it shall operate on receipt of minimum three positive feedback signals, namely differential relay, pressure relief valve or rapid pressure rise relay or Buchholz relay and electrical isolation of transformer through master trip relay or HV & LV circuit breaker in series to avoid any mal-operation of system .

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b. In Transformer Fire Prevention logic, Fire protection system shall operate in Auto mode on receipt of minimum three positive feedback signals, namely fire detector, pressure relief valve or rapid pressure rise relay or Buchholz relay / OSR (in case of fire in OLTC and electrical isolation of transformer through master trip relay or HV & LV circuit breaker in series to avoid any mal-operation of system.

c. Provision shall be made in system so that any of the above two logic can be disabled by operator from local panel only.

d. Supply and installation of Rapid Pressure Rise Relay shall be in the scope of the bidder.

7. Fire protection system shall operate in Remote electrical mode on receipt of signal for electrical isolation of transformer and by operating switch provided in a box which shall be accessible only after breaking the glass cover on control panel.

8. The Local manual operating system shall be used only in case if the system fails in Auto mode/ Remote electrical mode/ power failure. System if kept in manual mode must be clearly visible by a different alarm / LED.

9. The system shall start operation in auto or remote electrical or local manual, initially draining a pre- determined quantity of oil from the tank top through outlet valve to reduce the tank pressure and simultaneously closing Isolation valve in the conservator line and then inject nitrogen gas with appropriate flow rate at high pressure from lower side of the tank through inlet valves to create stirring action and reduce the temperature of top oil surface below flash point to extinguish the fire.

10. Isolation valve in the conservator line shall operate mechanically on transformer oil flow rate with electrical signal for monitoring on control panel. However in case of bursting of transformer bushing conservator oil should be isolated from main transformer tank without any additional signal to operate isolation valve.

11. Provision shall be available so that in case of accidental leakage of Nitrogen, the same should not affect the operation of Transformer.

6 The system shall have built in facility for monitoring or display of the following.

- i) Open /Close status of valves.
- ii) Healthiness of all sensors.
- iii) Operation of PRV
- iv) Healthiness of control cable
- v) Healthiness of control supply

7 Provision shall be available for annunciation (along with audible alarm) and a mimic panel of the following.

- i) Detection of fire due to external causes
- ii) Low nitrogen pressure.
- iii) System initiated
- iv) Tank pressure beyond the set limit
- v) Operating signal cable faulty.
- vi) Operation of conservator isolation valve (PNRV)

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- viii) Supply failure.
12. However bidder shall confirm whether it is advisable to initiate the system even when transformer is not electrically isolated due to stuck breaker problem etc.
 13. The system shall have built-in-on-line testing facility, which will be operable without affecting the functioning of the transformer.
 14. All valves used in system shall be stainless steel ball / butterfly type and of Legris make or equivalent as per the purchaser's approval. Limit switches shall be provided wherever required.
 15. The connecting cables shall be fire retardant low smoke (FRLS) armored cable. Cables passing along the top of the transformer shall be the fire survival (FS) type.
 16. The Pipe Line used for the system shall be of Class 'C' type.
 17. All the hardware used in the system shall be stainless steel.
 18. Limit switches used in the panel shall be of Schmersal make or equivalent as per the purchaser's approval.
 19. Control cable gland used in system shall be of Lapp, Germany make or equivalent as per the purchaser's approval.
 20. Fire extinguishing cubicle shall be of 3mm thick CRCA sheet with PU painting and IP 55 enclosure protection class and shall accommodate nitrogen gas cylinder of adequate capacity and associated accessories like regulator, high pressure tubing etc.
 21. The remote control panel, to be mounted inside the control room shall accommodate the necessary control units, operating switches push buttons etc. and also alarm annunciation unit.
 22. The bidder shall, furnish the complete details including bill of materials of the fire prevention and extinguishing system offered. The list of all accessories including FRLS, fire survival cable, pipes, valves, sensors, control cubicle, nitrogen gas cylinder etc. shall be listed out and furnished in the offer.
 23. The bidder shall ensure that fire prevention and extinguishing system offered is full proof and reliable. Installation, testing and commissioning of the fire protection system shall also be in the successful bidder's scope.
 24. Bidder shall ensure that fire prevention and extinguishing system shall not affect the normal operation of power transformer.
 25. Fire protection scheme to the power transformer should have authentic certification regarding performance similar to one issued by LAPEM (MEXICO)/TAC/RDSO /any other approved standard laboratory.
 26. Similar units offered by bidder shall be in successful operation for a minimum period of two years.
 27. The bidder shall also furnish performance certificate for similar systems in proof of the satisfactory operation.
 28. NIDS is to be supplied with transformer unless specified elsewhere in the Bidding document.
 29. In All conditions Transformer shall have provision for future implementation of NIDS. In any condition OEM (PTR) guarantee shall remain the same as mention in "Guarantee" clause

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Surface preparation and painting

- The paint shall be applied by airless spray.
- Steel surfaces shall be prepared by **shot blast cleaning** (IS-9954) to grade Sq.2.5 of ISO 8501-1 or **chemical cleaning** including phosphating of the appropriate quality (IS 3618).
- Heat resistant (Hot oil proof) paint** shall be used for the **inside surface** and whereas for **external surface one coat of thermosetting powder paint or one coat of epoxy primer (zinc chromate) followed by two coats of polyurethane (P.U.) base paint.** as per table given below:

S. No.	Paint type (should be UV restraint, non-fading)	Area to be painted	No of coats	Total dry film thickness (min); micron
1.	Thermosetting powder Paint	Inside Outside	01 01	30 60
2.	Liquid Paint			
a.	Epoxy (primer)	Outside	01	30
b.	P.U. Paint (finish paint)	Outside	02	25 (each)
c.	Hot oil resistant paint	Inside	01	35

The two coats shall be of oil and weather-resistant nature with final coat as flossy and non-fading paint of shade 631 as per IS 5 or RAL 7032.

- The dry film thickness shall not exceed the specified minimum dry film thickness by more than 25%.
- Any damaged part shall be cleaned to bare metal with an area extending 25 mm around its boundary. A priming coat shall be immediately applied followed by full paint finish equal to that originally applied and extending 50 mm around the perimeter of the original damage. The repainted surface shall present a smooth surface which shall be obtained by carefully chamfering the paint edges before and after priming.
- Painting shall not affect by weather changes & performance against pilling out or fading etc. to be guaranteed for 5 Years.

Name plate and marking

- A stainless steel rating plate, of at least 1 mm thickness, shall be fitted to each transformer in a visible position and shall carry all the information as specified in the standards.
- The letters on the rating plate shall be engraved black on the white/silver back ground.
- Fixing screws for outdoor use shall be of stainless steel or any other corrosion resistant metals.
- The Name plate shall be embossed with "PO no. with date" & "PROPERTY OF TPNODL".
- Danger notice shall have red lettering on a white background or they may be pictorial as approved by the Purchaser.

The name plate shall contain following information:

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- a) Type of transformer (Two Winding Transformer)
- b) Relevant standard.
- c) Manufacturer's Name
- d) Manufacturer's Serial No.
- e) Year of Manufacture
- f) No. of phases
- g) Rated kVA
- h) Rated frequency
- i) Rated Voltage
- j) Rated current
- k) Connection symbol
- l) Percentage impedance voltage at rated current.
- m) Type of cooling (ONAN).
- n) Total Mass.
- o) Mass and Volume of insulating Oil.
- p) Connection diagram showing the internal connections.
- q) Temperature rise
- r) Insulation levels of the windings, including neutral end of windings with non-uniform insulation.
- s) Transportation weight
- t) Un-tanking weight.
- u) Core and windings weight
- v) Table giving the tapping voltage, tapping current and tapping power for each tapping.
- w) Values of short circuit impedance on the extreme tapings and on the principal tapping and indication of the winding to which the impedance is related.
- x) A table of all guaranteed particulars.
- y) Quantity of oil required for normal filling.
- z) HV and LV phase to phase clearances.
- aa) Vector diagram
- bb) Indication of the winding which is fitted with tapping.
- cc) Table giving the tapping voltage, the tapping current and the tapping power of each winding, for each tap.
- dd) Value of short circuit impedance on the extreme tapping and on the principal tapping and indication of the winding to which the impedance is related.
- ee) Information of the ability of the transformer to operate at a voltage exceeding 110 % of the tapping voltage or, for the principal tapping, 110 % of the rated voltage

Valve schedule plate

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The name plate shall contain information of all the valves, their locations, quantities and schematic for the valves

On load tap changer plate

The name plate shall contain following information:

- a) Type
- b) S.No.
- c) Year of Manufacturing
- d) Motor
 - i. Operating Voltage
 - ii. Normal Working Current
 - iii. Max. rated Though current
- e) Phase
- f) Frequency (Hz)
- g) Steps (Numbers)
- h) Step Voltage
 - i) Weight / Volume
 - i. Tap Changer without Oil (Kg)
 - ii. Oil (Kg)
 - iii. Total
- j) Control Voltage (V)
- k) Transition resistance (ohms)

Marshalling box

- a) Manufacture's Name.
- b) Manufacture's Serial No.
- c) Year of Manufacturing.
- d) Purchase Order No.

The following shall be clearly mentioned / Engraved on the Plate: "Property of TPNODL, Berhampur" Engraved drawing of control circuit, CT / PT circuit and TB shall be available on Marshalling Box and OLTC Box

Oil filling instruction plate for conservator

The name plate shall contain

- a) Step wise process for filling oil in conservator
- b) Table of fittings with functions
- c) Conservator diagram with oil filling process
- d) Precautions in detail

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7.14 CONTROL CONNECTIONS AND INSTRUMENT AND WIRING TERMINAL BOARD AND FUSES

- i) Normally no fuses shall be used anywhere instead of fuses MCB"s (both in AC & DC circuits) shall be used. Only in cases where a MCB cannot replace a fuse due to system requirements, a HRC fuse can be accepted.
- ii) All wiring connections, terminal boards, fuses MCB"s and links shall be suitable for tropical atmosphere. Any wiring liable to be in contact with oil shall have oil resisting insulation and the bare ends of stranded wire shall be sweated together to prevent seepage of oil along the wire.
- iii) Panel connections shall be neatly and squarely fixed to the panel. All instruments and panel wiring shall be run in PVC or non-rusting metal cleats of the compression type. All wiring to a panel shall be taken from suitable terminal boards.
- iv) Where conduits are used, the runs shall be laid with suitable falls, and the lowest parts of the run shall be external to the boxes. All conduit runs shall be adequately drained and ventilated. Conduits shall not be run at or below ground level.
- v) When 400 volt connections are taken through junction boxes or marshaling boxes, they shall be adequately screened and 400 volts Danger Notice must be affixed to the outside of the junction boxes or marshaling box. Proper color code for Red, Yellow, Blue wires shall be followed.
- vi) All box wiring shall be in accordance with relevant ISS. All wiring shall be of stranded copper (48 strands) of 1100 Volt grade and size not less than 2.5 sq.mm
- vii) All wires on panels and all multi-core cables shall have ferrules, for easy identifications, which bear the same number at both ends, as indicated in the relevant drawing.
- viii) At those points of interconnection between the wiring carried out by separate contractors, where a change of number cannot be avoided double ferrules shall be provided on each wire. The change of numbering shall be shown on the appropriate diagram of the equipment.
- ix) The same ferrule number shall not be used on wires in different circuits on the same panels.
- x) Ferrules shall be of white insulating material and shall be provided with glossy finish to prevent the adhesion of dirt. They shall be clearly and durably marked in black and shall not be affected by dampness or oil.
- xi) Stranded wires shall be terminated with tinned Ross Courtney terminals, claw washers or crimped tubular lugs. Separate washers shall be suited to the size of the wire terminated. Wiring shall, in general, be accommodated on the sides of the box and the wires for each circuit shall be separately grouped. Back of panel wiring shall be arranged so that access to the connecting items of relays and other apparatus is not impeded.
- xii) All circuits in which the voltage exceeds 125 volts, shall be kept physically separated from the remaining wiring. The function of each circuit shall be marked on the associated terminal boards.
- xiii) Where apparatus is mounted on panels, all metal cases shall be separately earthed by means of

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stranded (48 No.) copper wire of strip having a cross section of not less than 2 sq. mm where strip is used, the joints shall be sweated. The copper wire shall have green colored insulation for earth connections.

- xiv) All wiring diagram for control and relay panel shall preferably be drawn as viewed from the back and shall show the terminal boards arranged as in services.
- xv) Terminal block rows should be spaced adequately not less than 100 mm apart to permit convenient access to external cables and terminations.
- xvi) Terminal blocks shall be placed with respect to the cable gland (at a minimum distance of 200 mm) as to permit satisfactory arrangement of multicore cable tails.
- xvii) Terminal blocks shall have pairs of terminals for incoming and outgoing wires. Insulating barriers shall be provided between adjacent connections. The height of the barriers and the spacing between terminals shall be such as to give adequate protection while allowing easy access to terminals. The terminals shall be adequately protected with insulating dust proof covers. No live metal shall be exposed at the back of the terminal boards. CT terminals shall have shorting facilities. The terminals for CTs should have provision to insert banana plugs and with isolating links.
- xviii) All interconnecting wiring, as per the final approved scheme between accessories of transformer and marshaling box is included in the scope of this specification and shall be done by the Transformer supplier.
- xix) The schematic diagram shall be drawn and fixed under a transparent propane sheet on the inner side of the marshaling box cover.
- xx) To avoid condensation in the Marshaling Box, a space heater shall be provided with an MCB and thermostat.
- xxi) Suitable MV, CFL light shall be provided in the Marshaling Box for lightning purpose.

7.15 RADIO INTERFERENCE AND NOISE LEVEL

Transformers shall be designed with particular care to suppress at least the third and fifth harmonic voltages so as to minimize interference with communication circuits. Transformer noise level when energized at normal voltage and frequency shall be as per NEMA stipulations.

8. INSPECTION AND TESTING

- (i) The Contractor shall carry out a comprehensive inspection and testing program during manufacture of the transformer. This is, however, not intended to form a comprehensive programme as it is contractor's responsibility to draw up and carry out such a programme duly approved by the Employer.
- (ii) Transformer of each rating will be as per pre-type tested design.
- (iii) The pre-shipment checks shall also be carried out by the contractor.

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- (iv) The requirements on site tests are as listed in the specifications.
- (v) Certified test report and oscillograms shall be furnished to the Employer Consultants for evaluation as per the schedule of distribution of documents. The Contractor shall also evaluate the test results and rectify the defects in the equipment based on his and the Employers evaluations of the tests without any extra charges to the Employer. Manufacturer's Test Certificates in respect of all associated auxiliary and ancillary equipment shall be furnished.
- (vi) The bidder shall state in his proposal the testing facilities available at his works. In case full testing facilities are not available, the bidder shall state the method proposed to be adopted so as to ascertain the transformer characteristics corresponding to full capacity.

8.1 INSPECTION

Transformers not manufactured as per Type- Tested design shall be rejected.

I. Tank and Conservator

- a) Inspection of major weld.
- b) Crack detection of major strength weld seams by dye penetration test.
- c) Check correct dimensions between wheels, demonstrate turning of wheels, through 900 and further dimensional check.
- d) Leakage test of the conservator.

II. Core

- a) Sample testing of core materials for checking specific loss, properties, magnetization characteristics and thickness.
- b) Check on the quality of varnish if used on the stampings.
- c) Check on the amount of burrs.
- d) Visual and dimensional check during assembly stage.
- e) Check on completed core for measurement of iron loss, determination of maximum flux density,
- f) Visual and dimensional checks for straightness and roundness of core, thickness of limbs and suitability of clamps.
- g) High voltage DC test (2 KV for one minute) between core and clamps.

Please refer to "**Check-list for Inspection of Prime quality CRGO for Transformers**" attached at Annexure-A. It is mandatory to follow the procedure given in this Annexure.

iii) Insulating Material

- a) Sample check for physical properties of materials.
- b) Check for dielectric strength
- c) Check for the reaction of hot oil on insulating materials.

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iv) Winding

- a) Sample check on winding conductor for mechanical and electrical conductivity.
- b) Visual and dimensional checks on conductor for scratches, dent mark etc.
- c) Sample check on insulating paper for PH value, electric strength.
- d) Check for the bonding of the insulating paper with conductor.
- e) Check and ensure that physical condition of all materials taken for windings is satisfactory and free of dust.
- f) Check for absence of short circuit between parallel strands.

v) Checks Before Drying Process

- a) Check condition of insulation on the conductor and between the windings.
- b) Check insulation distance between high voltage connections, between high voltage connection cables and earth and other live parts.
- c) Check insulating distances between low voltage connections and earth and other parts.
- d) Insulating test for core earthing.

vi) Check During Drying Process

- a) Measurement and recording of temperature and drying time during vacuum treatment.
- b) Check for completeness of drying

vii) Assembled Transformer

- a) Check completed transformer against approved outline drawing, provision for all fittings, finish level etc.
- b) Jacking test on the assembled transformer.

viii) Oil: All standard tests in accordance with IS: 335 shall be carried out on transformer oil sample before filling in the transformer.

ix) Test Report for bought out items: The contractor shall submit the test reports for all bought out / sub contracted items for approval.

- a) Buchholz relay
- b) Sudden pressure rise relay on main tank
- c) Winding temperature indicators
- d) Oil temperature indicators
- e) Bushings
- f) Marshaling box
- g) On/Off Load Tap changer as per BOQ
- h) Any other item required to complete the works.

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- i) Porcelain, bushings, winding coolers, control devices, insulating oil and other associated equipment shall be tested by the contractor in accordance with relevant IS. If such requirement is purchased by the contractor on a sub-contract, he shall have them tested to comply with these requirements.

8.2 FACTORY TESTS

- i) All standards routine tests in accordance IS: 2026 with dielectric tests corresponding as per latest amendments to IS: 2026 shall be carried out.
- ii) All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. All routine/acceptance tests shall be witnessed by the purchaser/his authorized representative. All the components and fittings shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted on the Power Transformers in addition to others specified in IS/IEC standards. Test for the OLTC shall be done as per the IS 8468
- iii) All auxiliary equipment shall be tested as per the relevant IS. Test certificates shall be submitted for bought out items.
- iv) High voltage withstand test shall be performed on auxiliary equipment and wiring after complete assembly.
- v) Following additional routine tests shall also be carried out on each transformer:
- a) Magnetic Circuit Test Each core shall be tested for 1 minute at 2000 Volt AC
 - b) Oil leakage test on transformer

8.2.1 Type Test

8.2.1.1 The measurements and tests should be carried out in accordance with the standard specified in each case as indicated in the following table if the same tests were not conducted earlier at CPRI or any NABL accredited Laboratory on the transformers of the offered design without any cost implication on employer.

8.2.1.2 Transformer type tests

Type Test Standard	
Temperature Rise Test	IEC 76/IS 2026/IS6600
Impulse Voltage Withstand Test, including Full Waves and Chopped Waves as listed below	IEC 76/IS 2026
Noise Level Measurement	IEC 551

In accordance with IEC 76-3 the following sequence of impulses should have been/ should be applied;

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- One full wave at 50% BIL;
- One full wave at 100% BIL;
- One chopped wave at 50% BIL
- Two chopped waves at 100% BIL and
- Two full waves at 100% BIL.

The type tests to be carried out by the Bidder shall include but not limited to the following:

1. Measurement of winding resistance.
2. Measurement of voltage ratio and check of voltage vector relationship.
3. Measurement of impedance voltage / short-circuit impedance (Principal tapping) and load loss.
4. Measurement of no load loss and current.
5. Measurement of insulation resistance.
6. Dielectric Test.
7. Temperature rise for determining the maximum temperature rise after continuous full load run. The ambient temperature and time should be stated in the test certificate.
8. Tests on on-load tap-changer.
9. Short Circuit withstand test
10. Test to verify IP55 of Marshalling and cable boxes.
11. Lightning Impulse voltage test with chopped wave.

Note: The bidder shall submit the test report from CPRI or ERDA for g, i and k of the above mentioned.

Following type tests shall be carried out on one transformer of each rating, at the works of the bidder, in presence of Purchaser's representative.

1. Temperature rise test including DGA (DGA shall be done before & after the heat run test).
2. Impulse Test (Including chopped wave on all the three limbs of HV & LV).

The NIDS shall be subjected to the operational test at manufacturing works of Nitrogen Injection Fire Prevention and extinguishing system in presence of Purchaser's representative. The manufacturer's test certificates of various accessories of NIDS shall be furnished at the time of Inspection to the inspecting officer.

8.2.1.3 If the type test report(s) submitted by the bidder do not fulfill the criteria, as stipulated in this technical specification/ Bidder's offer, the relevant type test(s) has/ have to be conducted by the Bidder at his own cost in CPRI/ NABL accredited laboratory in the presence of employers representative(s) without any financial liability to employer in the event of order placed on him.

8.2.1.4 The offered transformer must be manufactured as per type tested design. A copy of type test certificate must be submitted by manufacturer to Engineer/Employer. Transformers offered without type tested however design shall not be accepted. In case manufacturer agrees for type

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testing of transformers, testing shall be conducted on manufacturer's cost. No claim shall be acceptable towards type testing. The transformers shall be accepted only on acceptance of type testing results by employer.

8.2.1.5 The supplier shall furnish calculations in accordance with IS: 2026 to demonstrate the Thermal ability of the transformers to withstand Short Circuit forces.

8.2.1(A) Special Test

The short circuit test shall be a mandatory test for each design shall be supplied by the manufacturer and no exception shall be allowed. The test shall be conducted as per latest standard tabled below:

Short Circuit Test	IEC 76 / IS 2026
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The following tests shall be carried out by mutual agreement between the purchaser and the bidder. All Tests shall be done as per the relevant standard. Test certificates shall be submitted for bought out items. High voltage withstand test shall be performed on auxiliary equipment and wiring after complete assembly.

- a) Measurement of the harmonics of the No-Load Current.
- b) Determination of transient voltage transformer characteristics.
- c) Measurement of insulation resistance to earth of the windings, and / or measurement of Dissipation factor (tan δ) of the insulation system capacitances.(These are reference values for comparison with later measurement in the field. No limitation for the values are given here.).
- d) Lightning impulse test on Neutral terminals.
- e) Long duration induced AC voltage test (ACLD) transformer winding 72.5 $U_m \leq 170kV$.
- f) Magnetic circuit (isolation) test.
- g) SFRA Test.

8.2.2 Stage Inspection

The supplier shall offer the core, windings and tank of each transformer for inspection by the Employers representative(s). During stage Inspection, all the measurements like diameter, window height, leg Centre, stack width, stack thickness, thickness of laminations etc. for core assembly, conductor size, Insulation thickness, I.D., O.D, winding height, major and minor insulations for both H.V and L.V windings, length, breadth, height and thickness of plates of Transformer tank, the quality of fittings and accessories will be taken / determined. The supplier can offer for final inspection of the transformers subject to clearance of the stage Inspection report by the Employer.

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8.2.3 Routine Tests

Transformer routine tests shall include tests stated in latest issue of IS: 2026 (Part –1).

These tests shall also include but shall not be limited to the following:

- (i) Measurement of winding DC resistance.
- (ii) Voltage ratio on each tapping and check of voltage vector relationship.
- (iii) Impedance voltage at all tapping's.
- (iv) Magnetic circuit test as per relevant ISS or CBIP manual or latest standard being followed.
- (v) Measurement of Load losses at normal tap and extreme taps.
- (vi) No load losses and no load current at rated voltage and rated frequency, also at 25% to 120 % of rated voltage in steps.
- (vii) Absorption index i.e. insulation resistance for 15 seconds and 60 seconds (R 60/ R 15) and polarization index i.e. Insulation Resistance for 10 minutes and one minute (R 10 mt / R 1 mt).
- (viii) Induced over voltage withstand test.
- (ix) Separate source voltage withstand test.
- (x) Tan delta measurement and capacitance of each winding to earth (with all other windings earthed) & between all windings connected together to earth.
- (xi) Measurement of zero sequence impedance
- (xii) Tests on On/Off Load Tap changer as per BOQ (fully assembled on transformer) as per IS 2026
- (xiii) Auxiliary circuit tests
- (xiv) Oil BDV tests
- (xv) Measurement of neutral unbalance current which shall not exceed 2% of the full rated current of the transformer.
- (xvi) Magnetic balance test
- (xvii) Leakage test.

Sr. No.	Test to be done	Reference BIS	Clause no.
1	Measurement of Winding Resistance	IS 2026 (Part 1)	16.2.1 & 16.2.3
2	Measurement of voltage ratio, polarity and vector group check	IS 2026 (Part 1)	16.3, 8.6, 8.7
3	Measurement of short impedance and load loss at 50% and 100% load	IS 2026 (Part 1)	16.4
4	Measurement of no load losses and magnetizing current at rated frequency and 90%, 100% and 112.5% of rated voltage	IS 2026 (Part 1)	16.5
5	Measurement of insulation resistance	IS 2026 (Part 1)	16.6

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6	Dielectric Test.	IS : 2026 (Part III)-2009	
7	Test on -Load Tap Changer.	IS : 2026-2011 (Part I)	10.8
8	Measurement of Zero-sequence impedance on three phase transformer.	IS : 2026-2011 (Part I)	3.7.3
9	Bushing shall be tested for Capacitance and Power factor and shall meet the manufacture's requirement.	IS : 2026 (Part III)	10
10	All CTs and resistance of image coil for winding temperature indicator shall be checked for ratio test, polarity and knee point voltage test.		
11	Determination of Capacitances and dissipation factor winding-to-earth and between windings.		
12	Magnetic balance test.		
13	Measurement of Magnetizing current at low voltage.		
14	Vacuum withstand test on tanks and radiators.		
15	The total Losses shall comprise of the No Load Losses, Load Losses (I^2R loss + stray loss) and Auxiliary Losses at rated output duly converted at 75 °C average winding temperature and shall also be indicated in the test report. Load losses shall be that corresponding to rated load on HV, LV windings.		
16	Physical Verification of complete Transformer with all assembly including test rollers, radiators, cable boxes etc.		
17	Voltage Regulation at rated load and at unit, 0.9, 0.8 lagging power factor.		
18	Measurement of Acoustic Noise Level.		
19	Functional tests on auxiliary equipment:-		

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	i. Test on OTI and WTI ii. High Voltage test on insulation test for Auxiliary Wiring. iii. High Voltage test on insulation test for Auxiliary Wiring		
20	Test on Oil filled in Transformer: i. Dielectric Strength of Oil ii. Water Content. iii. Dielectric Dissipation factor (tan delta at 90° C. iv. Resistivity		
6	Induced over voltage withstand test	IS 2026 (Part 3)	11
7	Separate Source voltage withstand test	IS 2026 (Part 3)	10
8	Oil Pressure test on completely assembled transformer at 0.35kg/sq.cm. for 8 hrs.	IS 1180 (Part 1)	21.5.1.2 & 21.5.1.3
9	BDV and moisture content of oil in transformer (Type-2 oil)	For mineral oil : IS 335 (2018)	For mineral oil: IS 335 Table 2

Six (6) set of certified test reports and oscillographs shall be submitted for evaluation prior to dispatch of the equipment. The contractor shall also evaluate the test results and shall correct any defect indicated by his and Employers evaluation of the tests without charge to the Employer.

Acceptance Tests

- At least 10% transformer of the offered lot (minimum of one) shall be subjected to all the tests mentioned under the section 'ROUTINE Test' in presence of TPNODL representative at the place of manufacture before dispatch without any extra charges. The testing shall be carried out in accordance with IS: 2026.
- Oil Leakage test for acceptance shall be conducted at pressure of 0.35kg/sq.cm for one hour as per IS2026.
- Temperature Rise Test (on one unit of first lot against every release order / PO for each rating, for further lots, TPNODL also reserves the right to perform Temperature rise if required) [As per IS 2026 (Part 2) Clause no.4]
- The painted surface shall pass the Cross Adhesion Test (IS1180 part 1 clause no. 21.4.d).
- At stage inspection -Checking of weight, dimensions, fitting and accessories, tank sheet thickness, oil quantity, material finish and workmanship, physical verification of core coil

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assembly and measurement of flux density on one unit of each rating of the offered lot with reference to the GTP and contract drawings.

6. At Final inspection, the incoming raw material and its movement/consumption record in the related jobs of TPNODL will be verified by inspecting officer. In case of any deviation or non- availability of such records, the offered lot may get rejected.

The format of final inspection as per annexure

Further tests

The purchaser reserves the right of having any other reasonable tests carried out at his own expense either before shipment, or at site to ensure that the transformer complies with the requirements of this specification.

8.2.4 TANK TESTS

a) Oil leakage Test :

The tank and oil filled compartments shall be tested for oil tightness completely filled with air or oil of viscosity not greater than that of insulating oil conforming to IS : 335 at the ambient temperature and applying a pressure equal to the normal pressure plus 35 KN/ m² measured at the base of the tank. The pressure shall be maintained for a period of not less than 12 hours of oil and one hour for air and during that time no leak shall occur.

b) Pressure Test

Where required by the Employer, one transformer tank of each size together with its radiator, conservator vessel and other fittings shall be subjected to a pressure corresponding to twice the normal head of oil or to the normal pressure plus 35 KN / m² whichever is lower, measured at the base of the tank and maintained for one hour.

c) Vacuum Test

One transformer tank of each size shall be subjected to the vacuum pressure of 60 mm of mercury. The tanks designed for full vacuum shall be tested at an internal pressure of 3.33 KN/m² (25 mm of mercury) for one hour. The permanent deflection of flat plates after the vacuum has been released shall not exceed the value specified in C.B.I.P. Manual on Transformers (Revised 1999) without affecting the performance of the transformer.

8.3 PRE-SHIPMENT CHECK AT MANUFACTURERS WORKS

- i) Check for proper packing and preservation of accessories like radiators, bushings, explosions vent, dehydrating breather, rollers, buchholz relay, control cubicle connecting pipes and conservator etc.
- ii) Check for proper provision of bracing to arrest the movement of core and winding assembly

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inside the tank.

iii) Gas tightness test to conform tightness.

1. Equipment shall be subject to inspection by a duly authorized representative of the Purchaser. Inspection may be made at any stage of manufacture at the option of the purchaser and the equipment if found unsatisfactory as to workmanship or material, the same is liable to rejection.
2. Bidder shall grant free access to the places of manufacture to Purchaser's representatives at all times when the work is in progress.
3. Inspection by the Purchaser or its authorized representatives shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications.
4. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by Purchaser.

Following documents shall be sent along with material:

- a) Test reports
 - b) MDCC issued by TPNODL
 - c) Invoice in duplicate
 - d) Packing list
 - e) Drawings & catalogue
 - f) Guarantee / Warrantee card
 - g) Delivery challan
 - h) Other Documents (as applicable)
5. In respect of raw material such as core stampings, winding conductors, insulating paper and oil, bidder shall use materials manufactured/supplied by standard manufacturers and furnish the manufacturers' test certificate as well as the proof of purchase from these manufacturers (excise gate pass) for information of the purchaser. The bidder shall furnish following documents along with their offer in respect of the raw materials:
 - a) Invoice of supplier.
 - b) Mill's certificate
 - c) Packing List.
 - d) Bill of Landing
 - e) Bill of entry certificate by custom
 6. After the main raw-material i.e. core and coil material and tanks are arranged and transformers are taken for production on the shop floor, to ensure the quality of transformers, the inspection shall be carried out by the purchase's representative at following stages:
 - i. Stage Inspection I – Bidder has to facilitate for stage inspection of Tank, HV and LV windings and Core of the offered transformers. Bidder has to facilitate for stage inspection of Tank, HV

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and LV windings in one inspection call without any extra charges. Multiple inspections calls for stage inspection-I will not be considered and the delay will be accountable at bidder end. At this stage checking of weights, dimensions, tank sheet thickness, Pressure and vacuum test and quality of material, finish & workmanship as per GTP/QA plan and approved drawings. During stage inspection TPNODL reserves the rights to dismantle the assembled core to ensure that the CRGO laminations used are of good quality.

- ii. Stage inspection II – Bidder has to facilitate for stage inspection -II for Core coil assembly of the offered transformers in without any extra charges. The testing shall be carried out in accordance with IS: 2026 and as per GTP/QA plan/Drawing.

Note: For Stage inspection, Annexure –II will be referred.

- iii. Final Inspection - Bidder has to facilitate for final inspection once the offered transformer is ready for dispatch. Inspection will be done as per w.r.t tests mentioned in Clause 7.2 and inspection test plan format in Annexure-III.

7. To ascertain the quality of the transformer oil, the original manufacturer's tests report shall be submitted at the time of inspection. Arrangements shall also be made for testing of transformer oil, after taking out the sample from the manufactured transformers and tested in the presence of purchaser's representative.
8. The Bidder shall intimate the purchaser in advance for inspection, so that an officer for carrying out inspection could be deputed, as far as possible within 07days (Within Berhampur)/ 12Days (outside Berhampur) from the date of intimation.
9. Further, about the readiness of the transformers, for final inspection for carrying out tests as per relevant IS/IECs shall be sent by the Bidder along with routine test certificates. The inspection shall normally be arranged by the purchaser at the earliest after receipt of offer for pre-delivery inspection.
10. In case of any defect/ defective workmanship observed at any stage by the purchaser's Inspecting officer, the same shall be pointed out to the Bidder in writing for taking remedial measures. Further processing shall only be done after clearance from the inspecting officer / purchaser.
11. All tests and inspection shall be carried out at the place of manufacture unless otherwise specifically agreed upon by the manufacturer and purchaser at the time of purchase/tender.
12. The manufacturer shall offer the inspector representing the Purchaser all reasonable facilities, without charges, to satisfy him that the material is being supplied in accordance with this specification. This will include Stage Inspection during manufacturing stage as well as during Acceptance Tests.
13. The bidder shall provide all services to establish and maintain quality of workmanship in his works and to ensure the mechanical / electrical performance of components, compliance with drawings, identification and acceptability of all materials, parts and equipment as per latest quality standards of ISO 9000.

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The Purchaser has the right to have the test carried out at his own by an independent agency wherever there is a dispute regarding the quality supplied. Purchaser has right to test 1% of the supply selected either from the stores or field to check the quality of the product. In case of any deviation purchaser have every right to reject the entire lot or penalize the bidder, which may lead to blacklisting, among other things

8.4 INSPECTION AND TESTING AT SITE

On receipt of transformer at site, shall be performed detailed inspection covering areas right from the receipt of material up to commissioning stage. An indicative program of inspection as envisaged by the Engineer is given below.

8.4.1 Receipt and Storage Checks

- i) Check and record conditions of each package visible parts of the transformers etc. for any damage.
- ii) Check and record the gas pressure in the transformer tank as well as in the gas cylinder.
- iii) Visual check of core and coils before filling up with oil and also check condition of core and winding in general.
- iv) The material received at Purchaser's store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Project Engineering department.
- v) In case the transformers proposed for supply against the order are not exactly as per the tested design, the Bidder shall be required to carry out the short circuit test and impulse voltage withstand test at its own cost in the presence of the representative of the Purchaser. The supply shall be accepted only after such test is done successfully, as it confirms on successful withstand of short circuit and healthiness of the active parts thereafter on un-tanking after a short circuit test. Apart from dynamic ability test, the transformers shall also be required to withstand thermal ability test or thermal withstand ability will have to be established by way of calculations.
- vi) The Purchaser reserves the right to conduct all tests on Transformer after arrival at site / stores and the manufacturer shall guarantee test certificate figures under actual service conditions.
- vii) The Purchaser reserves the right to conduct short circuit test and impulse voltage withstand test in accordance to IS, afresh on each ordered rating at purchaser cost, even if the transformer of the same rating and similar design are already tested. This test shall be carried out on a transformer to be selected by the purchaser either at the manufacturer's works when they are offered in a lot for supply or randomly from the supplies already made to purchaser's stores. The findings and conclusions of these tests shall be binding on the bidder.
- viii) Test at TPNODL store/Site: after receipt of transformers at TPNODL stores/Site, following minimum tests will be carried out.
 - a) Total weight of the transformer. (It should be as per the offer, subjected to tolerance as per approved drawings & GTPs).

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- b) Oil level in the transformer
- c) Verifications of all the fittings.
- d) Physical verification of all the transformers for any damages, oil leakage, quality of painting etc.
- ix) Test at site: The purchaser reserves the right to conduct all tests on Transformer after arrival at site/stores and the manufacturer shall guarantee test certificate figures under actual service conditions.

Shock/impact recorder data analysis to be submitted by bidder to ascertain the concealed damage if any during transportation/movement of transformer.

8.4.2 Installation Checks

- i) Inspection and performance testing of accessories like tap changers etc.
- ii) Check choking of the tubes of radiators
- iii) Test on oil samples taken from main tank top and bottom and cooling system. Samples should be taken only after the oil has been allowed to settle for 24 hours.
- iv) Check the whole assembly for tightness, general appearance etc.
- v) Oil leakage tests.

8.4.3 Pre-Commissioning Tests

After the transformer is installed, the following pre-commissioning tests and checks shall be done before putting the transformer in service.

- i) Megger Test
- ii) Phase relationship test (Vector group test)
- iii) Buchholz relay alarm & surge operation test (Physical)
- iv) Ratio test on all taps
- v) Low oil level (in conservator) alarm
- vi) Temperature Indicators (Physical)
- vii) Marshaling kiosk (Physical)

8.4.4 The following additional checks shall be made:

- i) All oil valves are incorrect position closed or opened as required
- ii) All air pocket are cleared.
- iii) Thermometer pockets are filled with oil
- iv) Oil is at correct level in the bushing, conservator, diverter switch & tank etc.
- v) Earthing connections are made.
- vi) Bushing arcing horn is set correctly and gap distance is recorded.
- vii) C T polarity and ratio is correct.

8.5 PERFORMANCE

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The performance of the transformer shall be measured on the following aspects.

- i) The transformer shall be capable of being operated without danger on any tapping at the rated KVA with voltage variations and $\pm 10\%$ corresponding to the voltage of the tapping
- ii) Radio interference and Noise Level
- iii) The transformer shall be designed with particular attention to the suppression of third and fifth harmonics so as to minimize interference with communication circuits.
- iv) The all accessories of transformer viz. OTI, WTI, buchholz relay, etc. shall be SCADA compatible.

8.6 FAULT CONDITIONS

- a) The transformer shall be capable of withstanding for two(2) seconds without damages any external short circuit to earth
- b) Transformer shall be capable of withstanding thermal and mechanical stresses conveyed by symmetrical or asymmetrical faults on any winding. This shall be demonstrated through calculation as per IS : 2026.
- c) Transformer shall accept, without injurious heating, combined voltage and frequency fluctuation which produce the 125% over fluxing condition for one minute and 140% for 5 seconds.

8.7 WITNESSING OF TESTS AND EXCESSIVE LOSSES

The Employer reserves the right to reject the Transformer if losses exceed the maximum specified as per Clause No 2. SPECIFIC TECHNICAL REQUIREMENTS (STANDARD CONDITIONS), item-35of this specification or if temperature rise of oil and winding exceed the values specified at item -26 of the above clause.

9. LIQUIDATED DAMAGES FOR EXCESSIVE LOSSES

There is no positive tolerance on the guaranteed losses offered by the bidder. However, the transformer(s) shall be rejected out rightly, if any of the losses i.e. no load loss or load loss or both exceed (s) the guaranteed maximum permissible loss figures quoted by the bidder in the Technical Data Schedule with the bid.

10. SPARE PARTS

In case the manufacturer goes out of production of spare parts, then he shall make available the drawings of spare parts and specification of materials at no extra cost to the Employer to fabricate or procure spare parts from other sources.

Mandatory Spare Parts

The suppliers shall provide the following mandatory spare s for each of Transformer supplied

1. H.V. & L.V. Bushing & Studs –Each 2 No’s
2. Bimetallic connector for H.V & L.V. Bushings – Each 2sets

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10.1 INSTRUCTION MANUAL

Eight sets of the instruction manuals shall be supplied at least four (4) weeks before the actual dispatch of equipment. The manuals shall be in bound volumes and shall contain all the drawings and information required for erection, operation and maintenance of the transformer. The manuals shall include amongst other, the following particular:

- a) Marked erection prints identifying the components, parts of the transformer as dispatched with assembly drawings.
- b) Detailed dimensions, assembly and description of all auxiliaries.
- c) Detailed views of the core and winding assembly, winding connections and tapings tap changer construction etc. These drawings are required for carrying out overhauling operation at site.
- d) Salient technical particulars of the transformer.
- e) Copies of all final approved drawings.
- f) Detailed O&M instructions with periodical check lists and Performa etc.

10.2 COMPLETENESS OF EQUIPMENT

All fittings and accessories, which may not be specifically mentioned in the specification but which are necessary for the satisfactory operation of the transformer, shall be deemed to be included in the specification and shall be furnished by the supplier without extra charges. The equipment shall be complete in all details whether such details are mentioned in the specification or not, without any financial liability to the Employer under any circumstances.

11. COMMISSIONING

The utility will give a 10 days' notice to the supplier of transformer before commissioning. The manufacturer will depute his representative to supervise the commissioning. In case, the manufacturer fails to depute his representative, the utility will go ahead with the commissioning and under these circumstances, it would be deemed that commissioning is done as per recommendations of manufacturer.

Packing

1. Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.
2. The packing may be in accordance with the bidder's standard practice but he should give full particulars of packing for the approval of the purchaser. Special arrangement should be made to facilitate handling and to protect the projecting connections from damage in transit.
3. The transformer shall be shipped filled with oil/without oil but with the tank filled with Nitrogen under pressure complete with gas cylinder reducer, connection and pressure gauges. (After testing dew point of the Nitrogen filled. Dispatch clearance will be given only after achieving satisfactory dryness i.e. dew point measurement results). These accessories will be part of purchase. However, if neutral grounding

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transformer and reactors are included in the scope, these can be transported with oil.

(Whichever way desired by the purchaser depending on the size etc.)

4. Provisions for monitoring of oil and gas pressure during transport and storage and a make-up Nitrogen cylinder shall be made.
5. A shock recorder also shall be provided during transport.
6. Bushings shall be packed in proper containers for transport.
7. All parts shall be adequately marked to facilitate field erection.
8. Boxes and crates shall be marked with the contract number and shall have a packing list enclosed showing the parts contained therein.
9. Unloading, dragging of transformer up to 50 meters & keeping it on foundation at TPNODL site/stores will be in the scope of supplier. The bidder shall take care of this point while quoting the rates for Freight & Insurance charges.
10. Impact recorder to be mounted on the transformer at strategic locations after discussing with purchaser so that any impact due to transportation can be recorded and accordingly necessary action can be taken. Suitable software and diagnosis tool to be provided that of impact recorder.

Note: One use plastic not to be used for packing of the material

12. GUARANTEE

The manufacturers of the transformer shall provide a guarantee of 60 months from the date of receipt of transformer at the stores of the Utility. In case the transformer fails within the guarantee period, the supplier will depute his representative within 15 days from date of intimation by the utility for joint inspection. In case, the failure is due to the reasons attributed to supplier, the transformer will be replaced/repared by the supplier within 2 months from the date of joint inspection.

1. Bidder shall stand guarantee towards design, materials, workmanship & quality of process/manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract.
2. In the event any defect is found by the Purchaser up to a period of 48 months from the date of commissioning or 60 months from the date of last supplies made under the contract, whichever is earlier.
3. Bidder shall be liable to undertake to replace/rectify such defects at his own costs, within mutually agreed timeframe, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the Purchaser's own charges (@ 20% of expenses incurred), from the Bidder or from the "Security cum Performance Deposit" as the case may be.
4. In case of Two Winding Power Transformer fails within the guarantee period the purchaser will immediately inform the Bidder who shall take back the failed Two Winding Power Transformer within 15 days from the date of intimation at his own cost and replace / repair the transformer within forty five days of date of intimation with a roll over guarantee.

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5.

The outage period i.e. period from the date of failure till unit is repaired / replaced shall not be counted for arriving at the guarantee period.

Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser

Quality control

1. The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing.
2. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished.
3. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.
4. The Bidder shall invariably furnish following information along with his bid, failing which the bid shall be liable for rejection. Information shall be separately given for individual type of equipment offered.
 - i. Statement giving list of important raw materials, names of sub-suppliers for the raw materials, list of standards according to which the raw materials are tested.
 - ii. List of tests normally carried out on raw materials in the presence of Bidder's representative, copies of test certificates.
 - iii. Information and copies of test certificates as in (I) above in respect of bought out accessories.
 - iv. List of manufacturing facilities available.
 - v. Level of automation achieved and list of areas where manual processing exists.
 - vi. List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspection.
 - vii. List of testing equipment available with the bidder for final testing of equipment along with valid calibration reports shall be furnished with the bid. Manufacturer shall possess 0.1 class instruments for measurement of losses.
 - viii. Quality Assurance Plan (QAP) withholds points for purchaser's inspection.
5. The successful Bidder shall within 30 days of placement of order, submit following information to the purchaser.
 - i. List of raw materials as well as bought out accessories and the names of sub-Suppliers selected from those furnished along with offer.
 - ii. Type test certificates of the raw materials and bought out accessories.

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The successful Bidder shall submit the routine test certificates of bought out accessories and central excise passes for raw material at the time of routine testing

Minimum testing facilities

Bidder shall have adequate in house testing facilities for carrying out all routine tests, acceptance tests and pre-dispatch inspection as per relevant International / Indian standards.

The bidder shall have minimum testing facilities in house for following:

- a) Heat run test
- b) SFRA
- c) Pre dispatch inspections.

Manufacturing activities

1. The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity.
2. This bar chart should be in line with the Quality assurance plan submitted with the offer.

This bar chart will have to be submitted within 15 days from the release of the order.

Spares accessories and tools

1. Bidder shall provide a list of recommended spares with quantity and unit prices for 5 years of operation after commissioning.
2. The Purchaser 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.
3. The Purchaser may order additional spares at any time during the contract period at the rates stated in the Contract Document.
4. Bidder shall give an assurance that spare parts and consumable items will continue to be available through the life of the equipment which shall be 25 years minimum.
5. However, the Purchaser shall be given a minimum of 12 months' notice in the event that the Bidder or any sub-vendor plans to discontinue manufacture of any component used in this equipment.
6. 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.

The bidder shall also provide the following mandatory spares along with the transformer.

- i) HT Bushing (1 no.)
- ii) LT Bushing (1no.)
- iii) Neutral Bushing (1 no.)
- iv) Buchholz Relay (1 no.)

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- v) Valves (1Set)
- vi) OTI, WTI (1 each)
- vii) PRV (1 no); OSR (1 no); MOG (1 no)
- viii) Transducers for OTI, WTI, PTI
- ix) Air cell (1 no.)
- xii) Set of gaskets (1 no.)
- xiii) Set of mandatory spares for tap changer (1 set)
- xiv) Oil – 10% extra
- xv) Radiator tube plug – 5 No
- xvi) Radiator tube valves – 2 No
- xvii) Radiator tube plug oil seals – 12 No
- xviii) MCCB (1 no.)
- xix) MCB (1 no.)
- xx) L/R switch (1 no.)
- xxi) R/L switch (1 no.)
- xxii) OLTC counter (1 no.)
- xxiii) Space heater & thermostat (1 no.)

Drawing and Documents

a. Following drawings and documents shall be prepared based on TPNODL specifications and statutory requirements and shall be submitted with the bid:

- b.** Completely filled in Technical Particulars and compliance to each clause of the specification General Technical Requirements to Additional Details.
- c.** Description of the transformer and all components including brochures.
- d.** General arrangement for Transformer.
- e.** Bill of material.
- f.** Experience Certificate and list
- g.** Type test certificates.
- h.** List of makes of major components as listed above.

1. Drawings / documents to be submitted after the award of the contract are as under:

Sr. No	Description	For Approval	For Review Information	Final Submission
1.	Technical Parameters	√	√	√
2.	GA Drawing of Transformer	√	√	√

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Sr. No	Description	For Approval	For Review Information	Final Submission
3.	HV and LV bushing internal view with terminal connector	√	√	√
4.	Internal coil arrangement with dimensions	√	√	√
5.	Breather Drawing		√	√
6.	Rating Plate	√	√	√
7.	Cooling calculation with no. of radiators and fins mentioned specifically	√	√	√
8.	Prismatic oil level gauge drawing			√
9.	Installation Instruction		√	√
10.	QA & QC Plan		√	√
11.	Test Certificates	√	√	√
12.	Shipping drawings showing dimensions and weights of each package.	√	√	√
13.	Assembly drawings and weight of main component parts.	√	√	√
14.	Drawings giving Weights for foundations	√	√	√
15.	Tap changing and name plate diagram.	√	√	√
16.	Schematic control along with logic block diagram and wiring diagram for all auxiliary equipment.		√	√
17.	Schematic diagram showing the flow of oil in the cooling system as well as each limb and	√	√	√

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	winding. Longitudinal and cross-sectional views showing the duct sizes, cooling pipes etc.			
18.	Large scale drawings of high and low tension windings of the transformers showing the nature and arrangement of insulation and terminal connections.	√	√	√
19.	Bushing drawing and specifications.	√	√	√
20.	Crane requirement for assembly and dismantling.		√	√
21.	Overhead Conductor Connections.		√	√
22.	Foundation drawing of transformer, radiator supports, etc.	√	√	√
23.	Valve Schedule details	√	√	√
24.	HV , LV Bushing fixing and connection Details		√	√
25.	Radiator drawing and their fixing arrangement.		√	√
26.	Marshaling junction box details	√	√	√
27.	Thermo junction box details.	√	√	√
28.	Neutral arrangement	√	√	√
29.	Drawing showing conservator with air bag	√	√	√

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	and oil filling instructions			
	In addition to the above, the following drawing / information for each item pertaining to marshalling box and OLTC shall also be supplied.			
30.	General arrangement drawing of the marshaling box	√	√	√
31.	Shipping drawings showing dimensions and weight of each package	√	√	√
32.	Drawing giving the weight for its foundation.	√	√	√
33.	Schematic control drawing and TB schedule / wiring diagram for all elements	√	√	√
34.	Valve Schedule	√	√	√
35.	Test report of all bought out elements.	√	√	√
36.	Cooler Control drawing	√	√	√
37.	The tightening torque chart	√	√	√

2. List of Calculations to be submitted:

All the calculations shall be step by step showing the use of formulas and other practical considerations. **Concise calculations in table or excel sheet shall not be accepted.** Also, the reference (only standard sources as IS, IEC or any such standard is acceptable) of the formulas shall be mentioned.

1. Resistance Calculation (75 deg. C)
2. Load Losses Calculation (at 75 deg. C)
3. No load Loss Calculation.
4. Auxiliary & Stray Loss Calculation.
5. Weight of Copper (Bare and with Insulation also).
6. Weight of Core.
7. BH curve & Loss/Kg graph of core material offered.

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8. Flux Density calculations.
9. Efficiency vs Load curve of the offered design.
10. Current Density Calculations.
11. Short Circuit withstand.
12. Temperature Rise Calculations.
13. Cooling Calculations.
14. Calculation sheet for Lifting lug design and mounting lug design to be submitted by Bidder.

3. Additional Documents to be submitted :

1. List of raw materials as well as bought out accessories and the names of sub-suppliers selected from those furnished along with offer.
2. Type test certificates of the raw materials and bought out accessories.
3. The successful Bidder shall submit the **routine test certificates of bought out accessories** and central excise passes for raw material at the time of routine testing.

All the documents & drawings shall be in English language. After the receipt of the order, the successful bidder will be required to furnish all relevant drawings/parameters/ calculation to TPNODL for approval.

Instruction Manuals: Bidder shall furnish two softcopies (CD) and four (4) hard copies of nicely bound manuals (In English language) covering erection and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices

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Annexure - A

Check-list for Inspection of Prime quality CRGO for Transformers

During inspection of PRIME CRGO, the following points needs to be checked by the Transformer manufacturer. Utility's inspector shall verify all these points during inspection:-

i) In case PRIME CRGO cutting is at works of Transformer Manufacturer:

Review of documents:

Purchase Order (unpriced) to PRIME CRGO supplier/Authorized Agency

Manufacturer's test certificate

Invoice of the

Supplier Packing

List

Bill of Lading

Bill of Entry Certificate by Customs Dep't.

Reconciliation Statement as per format

below Certificate of Origin

BIS Certification

Format for Reconciliation/Traceability records

Packing List No. /date /Quantity of PRIME CRGO

received Name of Manufacturer

Manufacturer test certificate no. /date

Serial No.	Details of Package/Job	Drawing Reference	Quantity Involved	Cumulative Quantity Consumed	Balance Stock

(i) 2.1 Inspection of PRIME CRGO Coils:

PRIME CRGO-Manufacturer's Identification Slip on PRIME CRGO Coils

Visual Inspection of PRIME CRGO Coils offered as per packing list (for verification of coil details as per Test certificate & healthiness of packaging).

Unique numbering inside of each sample of PRIME CRGO coil and verification of records to be maintained in the register for consumption of CRGO coil.

ISI logo sticker on packed mother coil and ISI logo in Material TC.

2.2. During inspection of PRIME CRGO, surveillance testing of sample shall be carried out for Stacking Factor, Permeability, Specific watt loss at 1.5 Tesla and/or 1.7 Tesla depending on the grade of PRIME

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CRGO and aging test etc. applicable as per relevant IS/ IEC standard, Tech. Spec., MQP and Transformer manufacturer plant standard.

Inspection Clearance Report would be issued after this inspection

3 Inspection of PRIME CRGO laminations: Transformer manufacturer will maintain records for traceability of laminations to prime CRGO coils and burr/bow on laminations shall be measured. Utility can review these records on surveillance basis.

4. Inspection at the time of core building:

Visual Inspection of PRIME CRGO laminations. In case of suspected mix-up/ rusting/dicoloration, samples may be taken for testing on surveillance basis for tests mentioned in A.2.2 above.

Above tests shall be witnessed by Utility. In case testing facilities are not available at Manufacturer's work, the sample(s) sealed by Utility to be sent to approved labs for testing.

Inspection Clearance Report would be issued after this inspection

(i) In case PRIME CRGO cutting is at Sub-vendor of Transformer Manufacturer:

Review of documents:

Purchase Order (unpriced) to PRIME CRGO supplier/ Authorized

Agency Purchase Order (unpriced) to Core Cutter

Manufacturer test

certificate Invoice of the

Supplier Packing List

Bill of Lading

Bill of Entry Certificate by Customs Dep't.

Reconciliation Statement as per format

below Certificate of origin

BIS Certification

Format for Traceability records as below:-

Packing List No. /date /Quantity of PRIME CRGO

received Name of Manufacturer

Manufacturer test certificate no. /date

Serial No.	Name of Customer	Details of Package/Job	Drawing Reference	Quantity Involved	Cumulative Quantity Consumed	Balance Stock	Dispatch details

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(ii) 1 Inspection of PRIME CRGO Coils:

PRIME CRGO-Manufacturer’s Identification Slip on PRIME CRGO Coils

Visual Inspection of PRIME CRGO Coils offered as per packing list (for verification of coil details as per Test certificate & healthiness of packaging).

Unique numbering inside of each sample of PRIME CRGO coil and verification of records to be maintained in the register for consumption of CRGO coil.

ISI logo sticker on packed mother coil and ISI logo in Material TC.

2.2. During inspection of PRIME CRGO, surveillance testing of sample shall be carried out for Stacking Factor, Permeability, Specific watt loss at 1.5 Tesla and/or 1.7 Tesla, thickness depending on the grade of PRIME CRGO and aging test etc. applicable as per relevant IS/IEC standard, Tech. Spec., MQP and Transformer manufacturer plant standard.

Inspection Clearance Report would be issued after this inspection

3 Inspection of PRIME CRGO laminations:

Transformer manufacturer representative will inspect laminations and issue their internal Inspection Clearance Report. Inspection will comprise of review of traceability to prime CRGO coils, visual Inspection of PRIME CRGO laminations and record of burr/bow. After clearance given by transformer manufacturer, Utility will issue an Inspection Clearance Report after record review. If so desired by Utility, their representative may also join transformer manufacturer representative during this inspection.

Inspection Clearance Report would be issued after this inspection

vi) Inspection at the time of core building:

Visual Inspection of PRIME CRGO laminations. In case of suspected mix-up/rusting/discoloration, samples may be taken for testing on surveillance basis for tests mentioned in B.2.2.

Inspection Clearance Report would be issued after this

inspection NOTE:-

a) Transformer Manufacturer to ensure that PRIME CRGO is procured from POWERGRID approved vendors and CRGO manufacturer should have valid BIS Certificate for respective offered Grade.

14.1 Transformer Manufacturer should also involve themselves for ensuring the quality of CRGO laminations at their Core Cutter’s works. They should visit the works of their Core cutter and carry out

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necessary checks.

a) General

If a surveillance sample is drawn and sent to TPL (if testing facility not available with the manufacturer), the Transformer manufacturer can continue manufacturing at their own risk and cost pending TPL test report on PRIME CRGO sample drawn. Decision for acceptance of PRIME CRGO shall be based upon report of the sample drawn.

These checks shall be read in-conjunction with approved Quality Plan, specification as a whole and conditions of contract.

Sampling Plan (PRIME CRGO)

33 / 11 kV	-1 st transformer and subsequently at random 10% of Transformers (min. 1) offered for inspection.
DTs and other ratings	-1 st transformer and subsequently at random 2% of Transformers (min. 1) offered for inspection.

NOTE: - One sample for each lot of CRGO shall be drawn on surveillance basis.

CRGO has to be procured only from POWERGRID approved vendors. List of such vendors is available at the following website. Since the list is dynamic in nature, the site may be checked from time to time to see the list of approved vendors.

<http://apps.powergridindia.com/ims/ComponentList/Power-former%20upto%20420%20kV-CM%20List.pdf>

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Annexure-B

Methodology for computing total owning cost for Power Transformer

TOC = IC + (A xWi) + (B xWc) ; Losses in KW	
Where,	
TOC	= Total Owning Cost
IC	= Initial tax of transformer quoted by the manufacturer
A factor	= Cost of no load losses in Rs/KW (A = 334447)
B factor	= Cost of load losses in Rs/KW (B = 151616)
Wi	= No load losses quoted by the manufacturer in KW
Wc	= Load losses quoted by the manufacturer in KW

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13. Technical data schedule for 3.15/5/8/10 MVA, 33/11 kV Power Transformer

S.No.	Description	Bidder offer
1	Name of Manufacturer	
2	Address	
3	Country of origin	
4	Applicable standard	
5	Maximum continuous rating (in MVA) in ONAN conditions	
6	No load voltage ratio at Principal (Nominal) tap (in KV/KV)	
7	Rated frequency (in Hz)	
8	Number of phases	
9	Type of cooling	
10	Connections	
	(i) H.V. Winding	
	(i) L.V. Winding	
11	Vector Symbol	
12	Tapping	
	(a) Range	
	(b) Number of Steps	
	(c) Variation of voltage in each step (in KV)	
	(d) No load voltage ratio in each tap (in KV/KV) for 33/11 KV	
	Tap Number	Voltage Ratio in KV/KV
	1	5.456
	2	5.391
	3	5.326
	4	5.261
	5	5.196
	6	5.131
	7	5.066
	8	5.001
	9	4.936
13	(i) Temperature rise under normal operating condition above 50 Deg C ambient temperature	
	(a) Top oil (in degree C)	
	(b) Windings (in degree C)	
	(ii) Maximum hot spot temperature of copper windings (in degree C)	
14	Magnetizing current referred to H.V. AT Rated frequency	
	(a) at 90% rated voltage : (in Amps)	
	(b) at 100% rated voltage ; (in Amps)	
	(c) at 110% rated voltage ; (in Amps)	

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15	Power factor of magnetizing current at 100% Rated Voltage & Frequency	
16	No load current at rated voltage and at rated frequency	
1	No load loss in KW at rated frequency and voltage	
7	(a) at Lowest Tap	
	(b) at principal Tap	
	(c) at highest Tap	
1	Load loss in KW AT 75 Deg. C. at rated output and frequency	
8	(a) at Lowest Tap	
	(b) at principal Tap	
	(c) at highest Tap	
1	Percentage Regulation at full load 75 Deg.C	
9	(a) at unity power factor	
	(b) at 0.8power factor lagging	
2	Efficiencies at 75 Deg.C (I percentage)	
0	(a) at full load	
	(i) at unity power factor	
	(ii) at 0.8power factor lagging	
	(b) at 3/4 full load	
	(i) at unity power factor	
	(ii) at 0.8power factor lagging	
	(c) at 1/2 full load	
	(i) at unity power factor	
	(ii) at 0.8power factor lagging	
21	Impedence voltage on rated MVA base at rated current and frequency for the Principal tapping 75 Deg. C. (in percentage)	
2	(a) Reactance voltage at rated current and frequency for the principal tapping at 75 degree C. (in percentage)	
2	(b) resistance voltage at rated current and frequency for the principal tapping at75 degree C. (in percentage)	
2	Resistance at 75 Deg, C.	
3	(a) HV at Principal Tap	
	(b) LV	
2	Reactance at H.V. base at 75 Deg, C.	
4	(a) at Lowest Tap	
	(b) at principal Tap	
	(c) at highest Tap	
25	Withstand time without injury for three phase dead short circuit at terminal (in seconds)	
2	Short time current rating for short circuit with duration	
6	(a) HV winding (in K.Amps)	

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	(b) LV winding (in K.Amps)	
	(c) Duration (in seconds)	
27	Permissible overloading with time	
28	Core :	
	i) Type	
	ii) Flux density of core and yoke at principal tap	
	iii) Type of construction	
	iv) Core assembly details	
	a) at 100% rated voltage at 50 Hz (in Tesla)	
	b) at 112.5% rated voltage at 50 Hz (in Tesla)	
	iii) Thickness of stamping (in mm)	
	iv) Type of insulation between core laminations	
	v) Core bolt withstand insulation (in KV rms for 1 min)	
	vi) Approximate area of cross section of core and yoke (on sq. mm)	
	vii) Material of core clamping plate	
	viii) Thickness of core clamping plate (in mm)	
ix) Insulation of core clamping plate		
x) Describe location / Method of core grounding		
29	Terminal Arrangement	
	i) High voltage	
	ii) Low voltage	
30	Positive sequence Impedance at reference temperature of 75 Deg. C at principal tap (in percentage)	
	i) at principal tapping (in percentage)	
	ii) at lowest tapping (in percentage)	
	at highest tapping (in percentage)	
31	Zero sequence impedance at reference temperature of 75 degree .C at principal tap (in percentage)	
32	Details of Windings	
	i) Type of winding	
	(a) High voltage	
	(b) Low voltage	
33 i)	Winding conductor	
	Material of the conductor	
	(a) High voltage	
	(b) Low voltage	
	(c) LV conductor size (mm)	
	(d) HV conductor size (mm)	

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	(e) HV conductor size (mm)	
ii)	Conductor Area	
	(a) High voltage (in sq. mm)	
iii)	(b) Low voltage (in sq. mm)	
	Current density of windings at rated MVA	
IV)	(a) High voltage (Amp. per sq. mm)	
	(b) Low voltage (Amp. per sq. mm)	
v)	Insulation material used for	
	(a) High voltage Winding	
VI)	(b) Low voltage winding	
	Insulation material used between	
VII)	(a) High Voltage and low voltage winding	
	(b) Low Voltage winding and core	
VIII)	Whether adjustable coil clamps are provided for H.V. & L.V. winding (if yes, details may be given)	
	Type of axial coil supports	
34	(a) HV winding	
	(b) LV winding	
35	Type of Radial Coil Supports	
	(a) HV winding	
36	(b) LV winding	
37	Insulation withstand Test voltages	
	i) Lightning Impulse withstand test voltages (kv peak)	
38	ii) Power frequency withstand test voltage (in kv rms for 1 min)	
	iii) Induced over voltage with stand test (in kv rms)	
39	Current in the winding at rated MVA	
	(a) High voltage (in Amps)	
	(b) Low voltage (in Amps)	
	Voltage per turn (kv per turn)	
	Ampere turn	
	Number of turns	
	(a) High voltage	
	(b) Low voltage	
	Details of tap changer	
	i) Number of steps	
	ii) Number of Plus taps	

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	iii) Number of minus taps	
	iv) Position of taps on HV	
	v) Type of tap changing arrangement	
40	Bushing:	
i)	Make	
ii)	Type	
iii)	Application standard	
iv)	Bushing:	
a)	Lightning Impulse withstand test voltage (1.2x50 mcs in kv Peak)	
	Power frequency with stand test voltage (in KV rms for 1 min)	
b)	1) Dry	
	2) Wet	
v)	Creepage distance (total in mm)	
vi)	Minimum height of the bushing	
vii)	Mounting	
41	Minimum clearance (in mm)	
	i) H.V.	
	ii) L.V.	
	iii) Core- LV	
	iv) LV-HV	
	v) Ph-Ph	
	vi) HV-Tank	
42	Particulars of bushing & Neutral	
	C.T.	
	i) Type	
	ii) Ratio	
	iii) Accuracy class	
	iv) Knee point voltage	
	v) RCT at 75 deg.C	
	vi) Magnetizing current at knee point voltage	
	vii) Additional winding particulars of testing on CT	
	viii) Short time rating	
	ix) Reference standard	
43	Approximate weight of transformers in KG	
	i) Core with clamping	

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	ii) Core with insulation	
	iii) Core and winding	
44	Tank and fitting with accessories	
	i) Un-tanking weight	
	ii) Oil required for first filling	
	iii) Total weight with core ,winding , oil, fittings (Kg)	
45	Details of tank	
i)	Type of tank	
	a) Tank length (mm)	
	b) Tank width (mm)	
	c) Tank Height (mm)	
	Approximate thickness of sheet (in mm)	
ii)	a) sides	
	b) Bottom	
	c) Cover	
	d) Radiators	
iii)	Vacuum recommended for hot oil	
iv)	Vacuum to which the tank can be subjected without distortion (in torr.)	
v)	Under carriage dimensions	
	a) No. of directional wheels provided	
	b) Track gauge required for the wheels	
vi)	Dimension of base channel (in mm x mm)	
vii)	Type of pressure relief device/ Explosion Vent and pressure at which operates.	
	Tank Material	
46	Conservator	
	i) Total volume (in liter)	
	ii) Volume between the highest and lowest visible oil level (in liters)	
	iii) Type	
	iv) Thickness of sheet	
	v) Dimension (Dia x Length) (mm x mm)	
47	Oil Quality	
	i) Applicable standard	
	ii) Total quantity of oil (in liter)	
	ii) BDV value of oil	
	a) New unfiltered oil (KV rms) (Min)	
	b) After Filtration of oil (KV rms) (Min)	
48	Radiator	

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	i) Number of radiators banks	
	ii) Number of tubes/fins in each radiator bank	
	iii) Thickness of tubes/fins (in mm)	
	iv) Overall dimensions (in mm)	
	a) Center to center	
	b) Breadth	
	c) Number of tubes/fins in each radiator bank	
	v) Type of mounting	
	vi) Vacuum withstand capability	
49	Gas and Oil Actuated relay	
	i) Make	
	ii) Type	
	iii) Number of float contacts	
50	Temperature indicators	
	i) Make	
	ii) Type	
	iii) Permissible setting ranges for alarm and trip	
	iv) Number of contacts	
	v) Current rating of each contact	
51	Approximate overall dimensions (in mm)	
	a) Length	
	b) Breadth	
	c) Height	
	d) Minimum height of bottom most portion of bushing from bottom of base channel	
52	Minimum clearance height for lifting tank cover(in mm)	
53	Make of OLTC	
54	Whether OLTC is Type tested	
55	Whether OLTC is in line with the specification	
56	Make of RTCC	
57	Highest System voltage	
58	Maximum system voltage ratio	
59	System earthing details	
60	No of winding	
61	Type of Mounting (Transformer)	
62	MVA Rating corresponding to ONAN cooling system	
63	Paint Shade	
64	Polarization Index	

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65	Absorption index	
66	Noise Level at rated voltage	
67	Specify transport dimension	
68	Anticipated unbalanced loading	
69	Overtoltage operation capability & duration	
70	Anticipated continuous loading of winding	
71	Performance criteria	
72	Temp. gradient between core & surrounding oil	

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A) INSPECTION TEST PLAN FOR STAGE INSPECTION- II OF POWER TRANSFORMER

S No.	Particulars	Details
(A)	GENERAL INFORMATION:	
1	Name of firm	
2	Order No. and Date	
3	Details of offer	
a)	Rating	
b)	Quantity	
c)	Serial Numbers	
4	Details of last stage inspected lot:	
a)	Total quantity inspected	
b)	Serial Numbers	
c)	Date of stage inspection	
d)	Quantity offered for final inspection of (a) above with date	
(B)	Position of manufacturing for the offered quantity:	
a)	Complete tanked assembly	
b)	Core and coil assembly ready	
c)	Core assembled	
d)	Coils ready for assembly	
	i) HV coils	
	ii) LV coils	

Note: i) The stage inspection-II shall be carried out in case:-

- a) 100% quantity of core coil assembly shall be ready for inspection.

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ii) Quantity offered for stage inspection should be offered for next level of Inspection within 15 days from the date of issuance of clearance for stage inspection, otherwise stage inspection already cleared shall be liable for cancellation.

ANNEXURE-C

Inspection Test Plan for Power Transformers

1	Name of the firm / BA	
2	Date of inspection	
3	Details of offer made	
	(i) Order No. and date	
	(ii) Rating	
	(iii) Quantity	
	(iv) Sl. No. of transformers	
4	Date of stage inspection of the lot	
5	Reference of stage inspection clearance	
6	Sample Quantity (10% of the offered lot, min. one)	Sr. No.-----

S. No.	Name of test	Specified value(Range)	Reference documents	Test Result	Pass/Fail
1	Visual inspection for material, finish and workmanship	Free from cracks, nicks, protrusion and other visible defects.	TPNODL specification		
2	Physical Verification of complete Transformer with all assembly including test rollers, radiators, cable boxes etc. and Checking of weights, Dimensions.	GTP Values	TPNODL specification		

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3	Measurement of Winding Resistance	GTP Values	IS : 2026-2011 (Part I) cl. 10.2		
4	Measurement of voltage ratio and phase displacement	GTP Values	IS : 2026-2011 (Part I) cl. 10.3		
5	Verification of vector group relationship	DYn11	IS : 2026-2011 (Part I) cl. 8.6, 8.7		
6	Measurement of short-circuit impedance and Load Loss.	GTP Values	IS : 2026-2011 (Part I) cl. 10.4		
7	Measurement of No-Load Loss and Current (Losses at 90, 100 and 110% of rated voltage).	GTP Values	IS : 2026-2011 (Part I) cl. 10.5		
8	Measurement of insulation resistance.	GTP Values	IS : 2026-2011 (Part I) cl. 10.1.3		
9	Dielectric Test	GTP Values/TPNODL Specification	IS : 2026 (Part III)- 2009		
10	Test on ON-Load Tap Changer	GTP Values/TPNODL Specification	IS : 2026-2011 (Part I) cl. 10.8		
11	Zero-Phase sequence Measurement	GTP Values	IS : 2026-2011 (Part I) cl. 10.7		
12	Oil Pressure/leakage test on completely assembled transformer at 0.35kg/sq.cm for 8 hrs.	Should withstand	TPNODL Specification		
13	Bushing shall be tested for Capacitance and Power factor and shall meet the manufacture's requirement.	GTP / TPNODL Specification	IS : 2026 (Part III) cl. 10		
14	All CTs and resistance of image coil for winding temperature indicator shall be checked for ratio test, polarity and knee point voltage test	GTP / TPNODL Specification	TPNODL Specification		

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15	Determination of Capacitances and dissipation factor winding-to-earth and between windings.	GTP / TPNODL Specification	IS : 2026 (Part I) cl.10.1.3		
16	Magnetic balance test	GTP / TPNODL Specification			
17	Measurement of Magnetizing current at low voltage		IS : 2026-2011 (Part I) cl. 10.1.3		
18	Voltage Regulation at rated load and at unit, 0.9, 0.8 lagging power factor	GTP/TPNODL specification	TPNODL		
19	Measurement of Acoustic Noise Level	GTP/TPNODL specification	TPNODL		
20	Functional tests on auxiliary equipment: i. Test on OTI and WTI ii. High Voltage test on insulation test for Auxiliary Wiring.	GTP/TPNODL specification	TPNODL specification		
21	Test on Oil filled in Transformer i. Dielectric Strength of Oil ii. Water Content. iii. Dielectric Dissipation factor (tan delta at 90° C. iv. Resistivity	GTP/TPNODL specification	TPNODL specification,		
22	Temperature rise test	GTP/TPNODL specification	IS : 2026 (Part II)		
23	Short Circuit withstand test	Should withstand	IS : 2026 (Part V)		
24	Test to verify IP55 of Marshalling and cable boxes.	Should Confirm IP55	TPNODL Specification		
25	Lightning Impulse voltage test with chopped wave.	GTP/TPNODL Specification	IS : 2026 (Part III) cl. 13		

PURCHASER'S OFFICER

BIDDER'S REPRESENTATIVE

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DATE OF INSPECTION

ANNEXURE – D

SOURCE OF MATERIAL/PLACES OF MANUFACTURE, TESTING AND INSPECTION

S No.	Item	Source of Material	Place of Manufacture	Place of testing and Inspection
1.	Core Laminations			
2.	Copper Conductor			
3.	Insulating winding wires			
4.	Transformer Oil			
5.	Press Boards			
6.	Kraft paper			
7.	Tank material			
8.	Gaskets			
9.	Bushing HV/LV			
10.	Paint			
11.	OLTC			
12.	NIDS			
13.	CTs			
14.	WTI			
15.	OTI			

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