



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

NIT No.: TPCODL/P&S/1000000094/2021-22

Open Tender Notification

for

**Rate contract for manufacture and supply of
Power Transformer 12.5/16 MVA,33/11KV**

**Tender Enquiry No.: TPCODL/P&S/1000000094/21-22,
Due Date for Bid Submission: 6 August 2021 [15:00 Hrs.]**

**TP Central Odisha Distribution Limited
(A TATA Power and Odisha Government Joint Venture)
Procurement & Stores Department,
2nd Floor, IDCO Towers, Janpath, Bhubaneswar – 751022**



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**INFORMATION TO THE BIDDERS TO PARTICIPATE IN E-OPEN
TENDER SYSTEM OF TPCODL**

-: Steps for E-tender submission:-

Bids are to be submitted only through online e-procurement platform, ARIBA. Any other form of bid submission will not be accepted. Online Link for submission of bid through ARIBA will be sent only after confirmation of payment of tender fee from bidder.

Step 1: The bidder can get primary information about the tender from the Newspaper advertisement / TPCODL website <www.tpcentralodisha.com> and can download the tender document from the above website.

Step 2: Non-Refundable Tender Participation Fee, as indicated in tender document, to be submitted before last date of tender fee payment, in the form of direct deposit/NEFT/RTGS in the following bank account.

Account Name: TP Central Odisha Distribution Limited
Bank Name: SBI, IDCO Towers, Bhubaneswar
Bank Account No. : 10835304915
IFSC Code : SBIN0007891

Step 3: Eligible and Interested bidder to send an email to TPCODL attaching duly signed and stamped letter on Bidder's letterhead, with following details, expressing their intend to bid against above tender:

| SI No | Description | Bidder's Response |
|-------|--|-------------------|
| i) | Tender Enquiry No. | |
| ii) | Description of materials / Works Tendered | |
| iii) | Name of the bidding company | |
| iv) | Name of the authorized contact person | |
| v) | Contact No. authorized person | |
| vi) | E-mail Id of the where online ARIBA link to be | |
| vii) | Tender Fee details (Amount / NEFT-RTGS UTR No | |
| viii) | GST No.of bidder | |

E-mail has to be sent to <asish.karmakar@tpcentralodisha.com> with copy to <debaprasad.das@tpcentralodisha.com> before "Last date and time for payment of Tender Participation Fee".



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Step 4: On receipt of the document as mentioned in Step 3 above and after due verification of the same, ARIBA link for participation in the tender will be sent to bidder's mail address from ARIBA system.

Step 5: In this mail there will be an online link as **Click Here** to participate in the tender.

Step 6: Click **"Click Here"** to access this event.

Step 7: If bidder is bidding first time for TPCODL through ARIBA site then please "Sign UP" by creating User Name and password as mentioned in Sign Up page. Please follow the process, as mentioned in the Sign Up page, during creation of User Name and password. Also a simple one-page registration screen will open for first time user. All * mark mandatory field to be filled in.

Those who are already having User Name and password for accessing TPCODL events, they can LOGIN using same User Name and password.

If bidder has got User name and password for their other customer, same will not be applicable for TPCODL.

Step 8: You will be able to see the RFQ

Step 9: After review and downloading of all documents click on **"Review Pre-requisites"**

Step 10: Review and accept **"Bidder Agreement"**.

Step 11: You can see attached pdf tender document against clause no 1.1.1 (Introduction).

Step 12: Vendor has to attach pdf version of technical bid in clause no. 2.1 and 2.2. In this field do not attach any price document.

Price schedule is attached in clause no.3.2. Same has to be downloaded and price and tax details to be filled in as per the format given, print to be taken in vendor's letter head and signature and seal to be made by authorised person. PDF version of this price bid to be attached in clause 3.2 For Price Bid put all the unit price and taxes and duties in provided field. Put "0" (ZERO) in not applicable field.

Step 13: After successfully putting Techno commercial offer and price part then click on **"Submit Entire Response"**

Note: Once user ID and password created, bidder can also login to ARIBA site through the following URL:

<https://service.ariba.com/Sourcing.aw/124997008/aw?awh=r&awssk=oxt0s1BN&dard=1>



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1.0 Event Information

1.1. Scope of work

Bids are invited from interested Bidders entering into a Rate Contract valid for 1 year for supply of the following items:

| S. No. | Description | EMD Amount (Rs.) | Tender Fee* (Rs.) |
|--------|--|------------------|-------------------|
| 1. | Supply of 12.5/16 MVA,33/11KV Power transformers as per specification., Quantity 8 nos | 7,80,000 | 5,000 |

**inclusive of GST*

1.2. Availability of Tender Documents

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

1.3. Calendar of Events

| | | |
|-----|--|-------------------------|
| (a) | Date of availability of tender documents from TPCODL Website | 15.07.2021 |
| (b) | Last date and time of Payment of Tender Fee | 24.07.2021, 15:00 Hours |
| (c) | Last Date of receipt of pre-bid queries, if any | 28.07.2021, 17:00 Hours |
| (d) | Last Date of Posting Consolidated replies to all the pre-bid queries as received | 31.07.2021, 17:00 Hours |
| (e) | Last date and time of receipt of Bids | 06.08.2021, 15:00 Hours |

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

1.4 Mandatory documents required along with the Bid

- 1.4.1 EMD of requisite value and validity
- 1.4.2 Tender Fee.
- 1.4.3 Requisite Documents for compliance to Qualification Criteria mentioned in Clause 1.7.
- 1.4.4 Acceptance of Specification, drawing with filled in GTP as per Annexure II.
- 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 Duly filled in Annexure V and VI.
- 1.4.8 Proper authorization letter/ Power of Attorney to sign the tender on the behalf of bidder.



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1.4.9 Copy of PAN, GST registration (In case any of these documents is not available with the bidder, same to be explicitly mentioned in the 'Schedule of Deviations')

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

1.5. Deviation from Tender

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

1.6. Right of Acceptance/Rejection

Bids are liable for rejection in absence of following documents:

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

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

1.7 Qualification Criteria

- a) The bidder should have an average annual turnover of Rs.16 crores in last three financial years (FY 18-19, FY 19-20 and FY 20-21). 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. TPCODL 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



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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 RC.

- d) The bidder should have supplied Power Transformers of same or higher rating with specifications as mentioned above, minimum 50% of the quantity tendered, during any one of the financial year out of the immediate past three financial years.
- e) The bidder should have In-house routine and acceptance testing facilities for acceptance as per relevant IS/IEC. Self-undertaking to be submitted in this regard. TPCODL reserves the right to inspect the said manufacturing facility as a proof of compliance to this parameter.
- f) The bid shall be accompanied by user's certificate (preferably issued within immediate last 5 years) from any Distribution Utility/ Reputed Private Organization/ State Govt. / Central Govt. or their undertaking(s) in support of satisfactory performance of the Transformer supplied earlier to them. In case the bidder has a previous association with Tata Power for similar products and services, the performance feedback for that bidder by TPC User Group shall only be considered irrespective of performance certificates issued by any third organization. Copy of performance certificates to be submitted in this regard.
- g) The bidder must have all statutory compliance like valid PAN no, GSTN etc. The bidder must submit the copy of all these registrations.

1.8. Marketing Integrity

We have a fair and competitive marketplace. The rules for bidders are outlined in the General Condition of Contracts. Bidders must agree to these rules prior to participating. In addition to other remedies available, TPCODL reserves the right to exclude a bidder from participating in future markets due to the bidder's violation of any of the rules or obligations contained in the General Condition of Contracts. A bidder who violates the market place rules or engages in behavior that disrupts the fair execution of the marketplace, may result in restriction of a bidder from further participation in the marketplace for a length of time, depending upon the seriousness of the violation. Examples of violations include, but are not limited to:

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

1.9. Supplier Confidentiality

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

2.0 Evaluation Criteria

- The bids will be evaluated technically and on qualifying criteria of tender terms and conditions.
- The bids will be evaluated commercially on over BOQ basis (all-inclusive lowest cost) for the complete tender as calculated in Schedule of Items [Annexure I].



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- Bidder has to mandatorily quote against each item of Schedule of Items [Annexure I]. Failing to do so, TPCODL may reject the bids.

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

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

2.1 Price Basis: Price will be fixed and firm during the contractual period.

3.0 Submission of Bid Documents

3.1 Bid Submission

Bidders are requested to submit their offer in line with this Tender document through e-tendering process.

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

No e-mail or verbal correspondence will be responded. All communication will be done strictly with the bidder who have done the above step to participate in the Tender.

Bids shall be submitted in 3(Three) parts:

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

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

Account Name: TP CENTRAL ODISHA DISTRIBUTION LIMITED

Bank Name: SBI, IDCO Towers, Bhubaneswar

Bank Account No.: 10835304915

IFSC Code: SBIN0007891

Note- EMD is preferred in form of Bank Guarantee and to be delivered at the following address. However, in view of present situation if Bidder is finding it difficult to make and submit BG for EMD amount, they can do online transfer of EMD amount in the above mentioned Account and submit proof of the same as part of Bid Submission.

Please note that in such case, Tender Fee and EMD should be strictly 2 separate transactions.

Please note as return of EMD from Bank Account is non-standard practice and the same may take more time than return of EMD BG.

EMD Original Hard Copy shall be delivered at the following address in Envelope clearly indicating Tender Reference/ Enquiry Number, Name of Tender and Bidder Name



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

SECOND PART: “TECHNICAL BID” shall contain the following documents:

- i) Requisite Documents for compliance to Qualification Criteria mentioned in Clause 1.7.
- ii) Acceptance of Specification as per Annexure II.
- iii) Duly signed and stamped ‘Schedule of Deviations’ as per Annexure III on bidder’s letter head.
- iv) Duly signed and stamped ‘Schedule of Commercial Specifications’ as per Annexure IV on bidder’s letter head.
- iv) Duly filled in Annexure V and VI.
- vi) Proper authorization letter/ Power of Attorney to sign the tender on the behalf of bidder.
- vii) Copy of PAN, GST registration (In case any of these documents is not available with the bidder, same to be explicitly mentioned in the ‘Schedule of Deviations’)

The technical bid shall be properly indexed and is to be submitted through TPCODL E-tender System (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 along with explicit break up of basic prices and Taxes & duties etc. In case any discrepancy is observed between the item description stated in Schedule of Items mentioned in the tender and the price bid submitted by the bidder, the item description as mentioned in the tender document (to the extent modified through Corrigendum issued if any) shall prevail.

Price Bid is to be submitted in soft copy through TPCODL E-Tendering system (Ariba) only. Hard copy of Price Bid not be submitted

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

EMD

**“Rate contract for Supply of 12.5/16 MVA Power Transformers
Tender No TPCODL/P&S/1000000094/2021-22**

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

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



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the Company and shall be accompanied by certified true copies of the resolutions, extracts of Articles of Association, special or general Power of Attorney etc. to show clearly the title, authority and designation of persons signing the Bid on behalf of the Company. Satisfactory evidence of authority of the person signing on behalf of the Bidder shall be furnished with bid.

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

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

3.2 Contact Information

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 TPCODL website by the stipulated timelines as detailed in calendar of events.

Communication Details:

Handling Executive for this Tender:

Name: Asish Karmakar
Contact No.: 8768455566
E-Mail ID: asish.karmakar@tpcentralodisha.com

Escalation: Senior General Manager (Material Procurement):

Name: Mr. Deba Prasad Dash
Contact No.: 9438297571
E-Mail ID: debaprasad.das@tpcentralodisha.com

3.3 Bid Prices

Bidders need to quote for all items as per the Price schedule attached in Annexure I. The bidder shall complete the appropriate Price Schedules included herein, stating the Unit Price for each item & total price with taxes, duties & freight up to destination at various sites of TPCODL. The all-inclusive prices offered shall be inclusive of all costs as well as Duties, Taxes and Levies paid or payable during the execution of the supply work, breakup of price constituents.

Applicable GST to be specified clearly.

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

3.4 Bid Currencies

Prices shall be quoted in Indian Rupees Only.

3.5 Period of Validity of Bids

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

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

RC Validity: - The validity of this rate contract shall be two years from the date of issuance.



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3.6 Alternative Bids

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

3.7 Modifications and Withdrawal of Bids

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

3.8 Earnest Money Deposit (EMD)

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

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

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

The EMD shall be forfeited in case:

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

Or

b) The successful Bidder does not

a) accept the Purchase Order, or

b) furnish the required Performance Security Bank Guarantee

3.9 Type Tests (if applicable)

The type tests specified in TPCODL 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 TPCODL

4 Bid Opening & Evaluation process

4.1. Process to be confidential

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

4.2. Technical Bid Opening

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

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

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

4.3. Preliminary Examination of Bids/Responsiveness

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

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

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

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

4.4. Techno Commercial Clarifications

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

4.5. Price Bid Opening

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

4.6. Reverse Auctions

TPCODL reserves the right to conduct the reverse auction (instead of public opening of price bids) for the products/ services being asked for in the tender. The terms and conditions for such reverse auction events shall be as per the Acceptance Form attached as Annexure VI of this document. The bidders along with the tender document shall mandatorily submit a duly signed copy of the Acceptance Form attached as Annexure VI as a token of acceptance for the same.

5 Award Decision

TPCODL will award the contract to the successful bidder whose bid has been determined to be the lowest-evaluated responsive bid as per the Evaluation Criterion mentioned at Clause 2.0. The Cost for the said calculation shall be taken as the all-inclusive cost quoted by bidder in Annexure I (Schedule of Items) subject to any corrections required in line with Clause 3.1 above. The decision to place purchase order/LOI solely depends on TPCODL on the cost



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competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that TPCODL may deem relevant.

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

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

6 Order of Preference/Contradiction

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

1. Schedule of Items (Annexure I)
2. Technical Specifications (Annexure II)
3. Special Conditions of Contract (Clause 7.0)
4. Submission of Bid Documents (Clause 3.0)
5. Acceptance Form for Participation in Reverse Auction (Annexure VI)
6. General Conditions of Contract (Annexure VIII)

7 Post Award Contract Administration

7.1. Special Conditions of Contract

- Rate contract shall be valid for a period of 1 year from the placement of Contract. Release Order (RO) shall be placed as per the requirement of TPCODL. Rate shall be firm and fixed during the validity of the contract.
- Business Associate (BA) shall submit applicable Performance Bank Guarantee as per GCC within 30 days of issuance of rate contract or release order. PBG applicable shall be 5% of Rate Contract Value or 10% of Release Order value. PBG against Release Order has to be submitted against each Release Order. In case of PBG against RC, validity of of BG shall be till expiry date of RC plus warranty period. In case of RO, each PBG shall be valid for the warranty period of material. In both cases claim period will be one month.
- Any change in statutory taxes, duties and levies during the contract period shall be borne by TPCODL. However, in case of delay in work execution owing to reasons not attributable to TPCODL, any increase in total liability shall be passed on the Bidder, whereas any benefits arising owing to such statutory variation in taxes and duties shall be passed on TPCODL.
- Statutory Variations: Any changes in existing taxes/ Duties and levies, Introduction of new taxes and duties etc. during the period of the contract shall be paid at actuals to BA subject to BA shall submit the tax break up in details, however, where BA has quoted the all-inclusive prices and not shown the tax break-up, this clause will not be applicable. The date of issue of MDCC shall be used for this purpose.
- Quotation in all BOQ items is mandatory, and bid shall be rejected if any line of found blank in price bid.
- Delivery period shall be 90 days from date of receipt of release order / CAT-A issuance, whichever is later
- Warranty period: As mentioned in technical specification, Annexure-II enclosed.
- Delivery location: TPCODL Store at Cuttack or at Bhubaneswar, Odisha.



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- Late delivery(LD) clause will be applicable as per GCC.
- All other terms and conditions of TPCODL General Conditions of Contract shall be applicable.
- TPCODL shall short close the issued Release Order / Rate contract, in case of any quality issues
- Terms of Payment:
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 Central Odisha Distribution Limited to Invoice Desk. The payment shall be released within 30 days from the date of submission of certified bills/ invoices.

7.2 Drawing Submission and Approval

The relevant drawings need to be submitted within two weeks of receipt of firm purchase order by the successful bidder to TPCODL for approval. In case, re-submission of drawings is required on request of TPCODL, same needs to be submitted back to TPCODL within 5 days of such request.

7.3 Payment Terms

As per SCC, Clause number 7.1.

7.4 Climate Change

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

7.5 Ethics

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

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

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

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



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

8 Specification and standards

As per Annexure II

9 General Condition of Contract

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

10 Safety

All jobs are this tender have to be executed strictly in compliance to the Safety terms and Conditions of TP Central Odisha Distribution Limited. Please refer attached Safety terms and conditions, Annexure-IX, for details. Violation of Safety norms will result in Penalty as mentioned in the above document.

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Annexure-I, Price Schedule

| SI No | Item Description | Qty | UOM | Rate (Rs/Number) | Amount (Rs) | GST Amount(Rs) | Total with GST (Rs) |
|-------|--|-----|------|------------------|-------------|----------------|---------------------|
| 1 | Supply of 12.5/16 MVA,33/11KV Power transformers as per specification. | 8 | Each | | | | |

NOTE:

- ii) All rates are to be quoted on delivered basis at TPCODL Store -Cuttack or Bhubaneswar, Odisha, and should be inclusive of freight, insurance, loading & unloading, handling charges and any other charges which may be applicable.
- iii) The overall period of the rate contract shall be for a period of 1 year. Release order shall be issued as per requirement of TPCODL.
- iv) The bids will be evaluated commercially on the Overall BOQ (inclusive all) lowest cost.
- v) The bidders are advised to quote prices strictly in the above format. Failing to do so, bids are liable for rejection.
- vi) 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.
- vii) No cutting/ overwriting in the prices is permissible.
- viii) Quantities mentioned above is for evaluation purpose only and not guaranteed. Quantities may change as per actual requirements.



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ANNEXURE III

Schedule of Deviations

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

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

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

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

Seal of the Bidder:

Signature:

Name:



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ANNEXURE IV

Schedule of Commercial Specifications

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

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

Seal of the Bidder:

Signature:

Name:



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ANNEXURE V

Checklist of all the documents to be submitted with the Bid

Bidder has to mandatorily fill in the checklist mentioned below:

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

Seal of the Bidder:

Signature:

Name



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ANNEXURE VI


ACCEPTANCE FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT

(To be signed and stamped by the bidder)

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


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

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

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| Document No. | ENG-HV | Eff. Date: 20.04.2021 | |
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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 12.5/16 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.
- 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 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.

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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(a) | Natural Cooling Rating (MVA) (ONAN) | 12.5MVA |
| 1(b) | Forced Cooling Rating (MVA) (ONAF) | 16MVA |
| 2 | No. of phases | 3 |
| 3 | Type of installation | Outdoor |
| 4 | Frequency | 50 Hz (± 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) & ONAF (Oil natural / Air forced) |
| 11 | MVA Rating corresponding to ONAN and ONAF 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 | Intended regular cyclic overloading of windings | As per IEC –76-1, Clause 4.2 |
| 16(a) | Anticipated unbalanced loading | Around 10% |
| 16(b) | Anticipated continuous loading of windings (HV / LV) | 110 % of rated current |
| 17(a) | Type of tap changer | On load tap changer |

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| | | | |
|-------|---|--|-----------------|
| 17(b) | Range of tapping | + 5% to – 15% in 9 equal steps of 2.5% each for off-load tap and in 17 equal steps of 1.25% each for On-load tap changer on HV winding | |
| 18 | Neutral terminal to be brought out | On LV side only | |
| 19 | Over Voltage operating capability and duration | 112.5 % of rated voltage (continuous) | |
| 20 | Maximum Flux Density in any part of the core and yoke at rated MVA with +12.5% combined voltage and frequency variation from rated voltage and frequency. | 1.9 Tesla | |
| 21 | Insulation levels for windings: - 1.2 / 50 microsecond wave shape Impulse withstand (KVP) | 33kV | 11kV |
| | | 170kV | 95kV |
| 21(a) | Power frequency voltage withstand (KVrms) | 70kV | 28kV |
| 22 | Type of winding insulation | | |
| 22(a) | HV winding | Uniform | |
| 22(b) | LV winding | Uniform | |
| 23 | Withstand time for three phase short circuit | 2 Seconds | |
| 24 | Noise level at rated voltage and frequency | As per NEMA Publication No. TR-1. | |
| 25 | Permissible Temperature rise over ambient temperature shall be as per IS-2026 | | |
| 26 | Minimum clearances in air (mm) :- | Phase to Phase | Phase to ground |
| | | 400 | 320 |
| 26(a) | HV | 400 | 320 |
| 26(b) | LV | 280 | 140 |
| 27 | Terminals | | |
| 27(a) | HV winding line end 36 KV oil filled communicating type porcelain bushings (Anti-fog type) | | |
| 27(b) | LV winding 12 KV porcelain type of bushing (Anti-fog type) – for outdoor 11 KV breakers (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 | | |

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| | | | |
|-------|--|---|-----|
| | <p><i>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></p> | | |
| 28 | Insulation level of bushing | HV | LV |
| 28(a) | Lightning Impulse withstand (KVP) | 170 | 95 |
| 28(b) | 1 Minute Power Frequency withstand voltage (KV – rms) | 70 | 28 |
| 28(c) | Creepage distance (mm) (minimum) | 900 | 300 |
| 29 | Material of HV & LV Conductor | Electrolytic Copper | |
| 30 | Maximum current density for HV and LV winding for rated current | 2.6tap A/MM ² | |
| 31 | 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. | |
| 32 | Core Assembly | Boltless type | |
| 33 | Temperature Indicator | | |
| 33(a) | Oil | One number | |
| 33(b) | Winding | One number | |
| 34 | <p>Losses: - The losses shall not exceed the value given below</p> | | |

| 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 |
|------------|--------------------------------|------------------------|--|
| 12.5/16 | 9.7 | 70 | 10 |

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

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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.
- 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.

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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%
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.

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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.

| | |
|-----------------------|--|
| IS:5 | Colour 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 |

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| 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 centre 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.
 - vii) Transportation dimensions drawings.
 - viii) Magnetization characteristic curves of PS class neutral and phase side current transformers, if applicable.

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- 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.

6.5 Exposed parts shall not have pockets where water can collect.

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- 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 prospane 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:
- Proper storage to avoid exposure as well as extremes of temperature.
 - Surface preparation prior to painting.
 - Mixing and thinning
 - Application of paints and the recommended limit on time intervals between coats.
 - 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.
- 6.13.3 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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6.13.4 The supplier shall, prior to painting protect nameplates, lettering gauges, sight glasses, light fittings and similar such items.

6.13.5 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.


6.13.6 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.

6.13.7 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 manufacture'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

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dry and while the surface is warm.

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.

6.13.8 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.

6.13.9 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 hardened 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) |
|--------|------------|--------------------|-------------|-------------------------------|
| | | | | |


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|---|-------------------------------------|---------|----|-----------|
| 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 |

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.
- 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

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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.
- 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.

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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.

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.

7.1.38 Minimum Thickness for the transformer shall be as follows:


| | |
|------------------------|----|
| Tank Side wall (mm) | 10 |
| Tank Top Cover (mm) | 12 |
| Tank Bottom Plate (mm) | 12 |
| Conservator (mm) | 06 |

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.

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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.

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 it's 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.

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- 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.
- 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 assemble shall be so fixed in the

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tank that shifting will not occur during transport or short circuits. The supporting frame work 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 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.

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- 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 the otherwise affected under the operating conditions.
- 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.

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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 assembles 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.
- 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.

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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 2.6 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 Tata Power).
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 | $>0.80 \text{ g/cm}^3$ | as per IS1576 w.r.t Thickness |

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| 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/m³)
2. Compressibility
3. Tensile strength
4. Conductivity of water extract
5. Shrinkage in air
6. Flexibility
7. Cohesion between plies¹.
8. Elongation
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 upto 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

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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.
 - 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 colour 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

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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 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 remove 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.

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- 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 colour float shall be provided on main tank and OLTC tank Conservator. Dual contacts are required for both MOGs (Main Tank & OLTC conservator).
 - a) Separate conservator tank shall be provided for OLTC. 120L tank shall be used for 66KV.
- 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 contacts, one for alarm on gas accumulation and the other for tripping on sudden rise of pressure.
- viii) **Temperature Indicator**

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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.
- 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.

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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) Space for accommodating Control & Protection equipment in future for the cooling fan (for ONAF type cooling, may be provided in future).
 - c) 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 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 ON-LOAD TAP-CHANGERS

- i) The 12.5/16 MVA transformers shall be provided with On-load Taps. Specification of OLTC is

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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 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 contacts 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.

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- 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
- “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.

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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.
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).


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- 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 propose 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.
- 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

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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 auto tripped
- 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.) This equipment is not required to be supplied by the bidder of the Transformer.

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

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

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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.
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.

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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:
- Visual examination
 - One minute dry withstand test
 - 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

- 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.
- 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.
- Where compressible gaskets are used, steps shall be provided to prevent over compression.
- All the bolts provided shall be of hot dip galvanized.
- 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


- 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.
- Radiators shall be metal spray painted.
- Bidder shall submit procedure for surface preparation and painting/galvanising of radiators along with the bid.
- Price for galvanized radiators shall be quoted separately.
- The colour shade for the radiator shall be shade 631 as per IS: 5.
- Tank mounted radiators/coolers shall be of the detachable type with bolted and gasketed flanged connections.
- The following accessories shall be provided for radiator:
 - Shut off valves and blanking plates on transformer tank at each point of connection.
 - Top and bottom shut off valves and blanking plates on each radiator.
 - Lifting lugs
 - Top oil filling plug.
 - Air release plug at top.
 - Oil drain plug at bottom.

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- 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. The transformer shall be provided with ONAF cooling system, which shall be designed to give 80% output at ONAN and 100% at ONAF. The cooling system shall comprise of two Nos. (2) 50% capacity radiator banks, to the sides of the tank.
2. The radiators shall have one (1) spare fan for each bank with the automatic switching scheme. In case of separately mounted radiator banks, it shall be possible to completely isolate each bank for maintenance and both the banks shall be interchangeable with each other. Bidder shall provide adequate number of fans of rating 0.25 kW each for cooling of the radiator.
3. Cooling fans shall not be directly mounted on radiator bank which may cause undue vibration. These shall be located vertically at the sides radiators but on separate support structure so as to prevent ingress of rain water. Each fan shall be suitably protected by galvanised wire guard to prevent accidental contact with the blades, the mesh being not greater than 25mm. The exhaust air flow from cooling fan shall not be directed towards the main tank in any case.
4. Cooling fan must be provided with metal net cover arrangement so that direct contact of birds and rodents can be avoided with fan blades.
5. An oil flow indicator shall be provided for the confirmation of the oil pump operating in a normal state. An indication shall be provided in the flow indicator to indicate reverse flow of oil/loss of oil flow.
6. Radiator’s fans motors shall be suitable for operation from 415 volts, three phase 50 Hz power supply and shall conform to IS:325. Each cooling fan shall be provided with starter thermal overload and short circuit protection. The motor winding insulation shall be conventional class 'B' type. Motors shall have hose proof enclosure equivalent to IP55 as per IS:4691.
7. 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. Drain valves shall be provided in order that each section of pipe work can be drained independently.

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8. Terminal covers and greasing cups of fan motors shall be accessible without removing the guard. The air blower shall be removable without dismantling supporting framework. The cooler and its accessories should be hot dip galvanised or corrosion resistant paint should be applied to it.
9. Radiators shall be designed to withstand the vacuum and pressure conditions specified for the tank. Coolers shall be so designed as to accessible for cleaning and painting, to prevent accumulation of water on the outer surface, to completely drain oil into the tank and to ensure against formation of gas pockets when the tank is being filled.
10. Radiators shall be connected to the tank by machined steel flanges welded to the cooler units and to the tank and provided with gaskets. Each cooler unit connection shall be provided on the tank and an indication for shut off valve which can be fastened in either open or closed position shall be provided. A separate oil tight blank flange shall be provided for each connection for use when the cooler unit is detached. Each cooler unit shall have a lifting eye.
11. Automatic operation control of fans shall be provided (with temperature change) from contacts of winding temperature indicator. The Bidder shall recommend the setting of WTI for automatic changeover of cooler control from ONAN to ONAF. The setting shall be such that hunting i.e. frequent start-up operations for small temperature differential do not occur.
12. Suitable manual control facility for cooler fans shall be provided. The changeover to standby fans in case of failure of service fans shall be automatic. Selector switches and push buttons, shall also be provided in the cooler control cabinet to disconnect the automatic control and start/stop the fans and manually.
13. Cooling Fans shall be suitable for operation with a 415 volts, 3 phase, 4 wire, 50 Hz supply. Auto changeover facility shall be provided to an alternate power supply. The auto changeover scheme shall be designed based on under-voltage relay logic, to take care voltage dips on 415V supply. Similarly 2 separate control transformers 415/220V with auto changeover facility shall be provided 220V control circuits for light and heaters in marshalling box.
14. Control equipment for fan motors shall be mounted in a marshalling cabinet adjacent to the transformer and shall include the necessary connections with automatic control and annunciator equipment and provision for manual control.
15. The main and starter control circuit and each feeder shall be provided with fuses at both ends so that in case of fault on any contactor coil only that particular fan will be cut out and other fans can remain in service. Each feeder shall also be provided with double pole switches to enable isolation of the corresponding contactor in case the replacement of same is necessitated.
16. Anodized aluminum plate showing details of all terminals nos.& drawing shall be provided along with marshalling box.
17. 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.

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18. 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.
19. 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 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.
20. Suitably rated switches shall be provided to enable the control supply to the transformer to be cut off from the cabinet.
21. 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.
22. 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 colour coded.
23. All terminal blocks shall have terminal nos. on either side of terminals.
24. Stud type fuse mounts shall be provided with an insulating cover as protection against accidental contact with live terminals.
25. Drawing pouch with cooler control scheme drawings and TB Schedule covered in the polythene paper shall be provided inside marshalling box on the door.
26. Acrylic name plates shall be provided on doors of marshalling box cabinet, CT junction box and thermo junction box. Name plates shall also be provided for all the components inside the marshalling box and to each cooler component (i.e. Fan No.1, Pump No.1 etc.).
27. Additional 230V, 15 Amps, 3 pin plug point shall be provided for testing purposes inside the marshalling box.
28. A suitably rated light point with its associated control switches shall be provided inside the housing for use in emergency.
29. All alarm and control devices shall be ungrounded.
30. 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.
31. 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.
32. A single metal-enclosed main isolating switch, with HRC fuses, shall be provided for the cooling plant.

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33. 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.
 34. 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.
 35. The local mechanical indication scheme for all annunciation shall be provided in the marshalling box with mechanical target relays/contactors.
 36. The following alarm indication shall be provided each with 2NO contacts.
 - i. Fan failure
 - ii. Failure of power supply/control supply.
 - iii. Conservator oil level low (MOG)/ Oil Level High
 - iv. PRD Trip./PRV TRIP
 - v. Buchholz relay trip/alarm.
 - vi. Winding Temperature high.
 - vii. Winding Temperature high-high.
 - viii. Oil Temperature high.
 - ix. Oil Temperature high-high.
 - x. Bucholz/OSR of OLTC trip
 - xi. 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) Cooling fan failure for each bank.
- c) Common thermal overload trip.
- d) 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 upto 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.

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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 finalised 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

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 Forced-air cooled (ONAF) | 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

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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 |
| 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 |

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| | | | equipment from damage in transit. |
| 17 | Marking | | The unit shall be appropriately marked as "PROPERTY OF TPCODL, BHUBANESWAR" 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 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.

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| 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 |
| 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 range: Oil Temperature | | 10°C to 100°C |
| 15 | Relay operating range: Oil Viscosity | | 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 |

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| | | | 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 |

- 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 :

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- 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.
- 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

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shall be provided with micro switches, instead of mercury switches for alarm and trip purpose. All the interconnected wiring between TJB, Marshalling 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 |
|--------|--|------|--|
| 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 |


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| 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 |
| 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) Radiators shall be complete with motors, fans etc as described in clause 5.10.
- xxx) Oil Preserving Equipment
- xxxi) Eye bolts and lugs on all parts for ease of handling.
- xxxii) Two grounding terminals.
- xxxiii) Diagram and rating plate.
- xxxiv) 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.
- xxxv) Separate tank mounted marshalling box for terminal blocks for current transformer secondary only with Cable conduits for cables from devices to marshalling box.
- xxxvi) 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
- xxxvii) Two silica gel breathers (more than 5kg) each of 100% capacity for main tank.
- xxxviii) Ladder with ant-climbing arrangement and lock. Ladder should mount on side of transformer and not on HV/ LV side bushing.
- xxxix) Inspection covers for transformer inspections on all phases (on vertical plane)
- xl) 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

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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 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

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The centre of gravity of the assembled transformer shall be low and as near the vertical centre line as possible. The transformer shall be stable with or without oil. If the centre 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

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.

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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 .
 - 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.
12. 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

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- iv) Healthiness of control cable
 - v) Healthiness of control supply
13. 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)
 - vii) Supply failure.
 14. 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.
 15. The system shall have built-in-on-line testing facility, which will be operable without affecting the functioning of the transformer.
 16. 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.
 17. The connecting cables shall be fire retardant low smoke (FRLS) armoured cable. Cables passing along the top of the transformer shall be the fire survival (FS) type.
 18. The Pipe Line used for the system shall be of Class 'C' type.
 19. All the hardware used in the system shall be stainless steel.
 20. Limit switches used in the panel shall be of schmersal make or equivalent as per the purchaser's approval.
 21. Control cable gland used in system shall be of Lapp, Germany make or equivalent as per the purchaser's approval.
 22. 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.
 23. 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.
 24. 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.
 25. 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.

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26. Bidder shall ensure that fire prevention and extinguishing system shall not affect the normal operation of power transformer.
27. 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.
28. Similar units offered by bidder shall be in successful operation for a minimum period of two years.
29. The bidder shall also furnish performance certificate for similar systems in proof of the satisfactory operation.
30. NIDS is to be supplied with transformer unless specified elsewhere in the Bidding document.
31. 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


Surface preparation and painting

1. The paint shall be applied by airless spray.
2. 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).
3. **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.

4. The dry film thickness shall not exceed the specified minimum dry film thickness by more than 25%.
5. 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.

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- 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 TPCODL”.
- 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:

- Type of transformer (Two Winding Transformer)
- Relevant standard.
- Manufacturer’s Name
- Manufacturer’s Serial No.
- Year of Manufacture
- No. of phases
- Rated kVA
- Rated frequency
- Rated Voltage
- Rated current
- Connection symbol
- Percentage impedance voltage at rated current.
- Type of cooling (ONAN / ONAF).
- Total Mass.
- Mass and Volume of insulating Oil.
- Connection diagram showing the internal connections.
- Temperature rise
- Insulation levels of the windings, including neutral end of windings with non-uniform insulation.
- Transportation weight
- Un-tanking weight.
- Core and windings weight
- Table giving the tapping voltage, tapping current and tapping power for each tapping.

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- 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

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)

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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 TPCODL, Bhubaneswar” 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

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 colour 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.

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- 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 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 coloured 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 prospane sheet on the inner

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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 programme 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.
- (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.

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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.

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.

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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.
- 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.

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- 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 Volt age 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;

- 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.

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| 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. <ol style="list-style-type: none"> 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 manufacture’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 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:

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| 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 ($\tan \delta$) 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 $72.5 < U_m \leq 170$ kV.
- 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.

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.

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- (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 |
| 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. | | |

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| 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 ² R 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 loses 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 | Measurement of the power taken by the fans | | |
| 20 | Functional tests on auxiliary equipment:- 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 | | |
| 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 | | |
| 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/sqcm 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 335Table 2 |

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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

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

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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 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 TPCODL
- c) Invoice in duplicate
- d) Packing list
- e) Drawings & catalogue
- f) Guarantee / Warrantee card

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- 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 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 TPCODL 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,

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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 Bhubaneswar)/ 12Days (outside Bhubaneswar) 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.

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.


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- 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 TPCODLstore/Site: after receipt of transformers at TPCODLstores/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).
 - 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

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- 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 in correct 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

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

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- 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 Nos
- 2. Bimetallic connector for H.V & L.V. Bushings – Each 2 sets

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.

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- 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 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.

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9. Unloading, dragging of transformer up to 50 meters & keeping it on foundation at TPCODL 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.

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

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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.

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

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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.)
- v) Valves (1Set)
- vi) OTI, WTI (1 each)

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- vii) PRV (1 no); OSR (1 no); MOG (1 no)
- viii) Transducers for OTI, WTI, PTI
- ix) Air cell (1 no.)
- x) Fan contactor with overload relay (1 no.)
- xi) Cooling fan (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 TPCODL 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 | √ | √ | √ |
| 3. | HV and LV bushing internal view with terminal | √ | √ | √ |

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| | 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 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 | √ | √ | √ |

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| | 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. | Marshalling junction box details | √ | √ | √ |
| 27. | Thermo junction box details. | √ | √ | √ |
| 28. | Neutral arrangement | √ | √ | √ |
| 29. | Drawing showing conservator with air bag 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 | √ | √ | √ |

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|--------|---|--------------|------------------------|------------------|
| | diagram for all elements | | | |
| 34. | Valve Schedule | √ | √ | √ |
| 35. | Test report of all bought out elements. | √ | √ | √ |
| 36. | Cooler Control drawing | √ | √ | √ |
| 37. | The tightening torque chart | √ | √ | √ |
| 38. | | | | |

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.
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.

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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 TPCODL 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

Annexure-B

Methodology for computing total owning cost for Power Transformer

| | | | |
|--|---|---|--------------|
| TOC = IC + (A xWi) + (B xWc) ; Losses in KW | | | |
| Where, | | | |
| TOC | = | Total Owing Cost | |
| IC | = | Initial costtaxe oftransform asquote bythe 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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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 Deptt.

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. | Deatails of Package/Job | Drawing Reference | Quantity Invoved | Commulative 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.

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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 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/decoloration, 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 Deptt.

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

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| Serial No. | Name of Customer | Deatails of Package/Job | Drawing Reference | Quantity Invoved | Commulative Quantity Consumed | Balance Stock | Dispatch details |
|------------|------------------|-------------------------|-------------------|------------------|-------------------------------|---------------|------------------|
| | | | | | | | |

(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/decoloration, 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

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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 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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13. Technical data schedule for 12.5/16 MVA, 33/11 kV Power Transformer

| S.No. | Description | Particulars | |
|-------|--|------------------------|--|
| 1 | Name of Manufacturer | | |
| 2 | Address | | |
| 3 | Country of origin | | |
| 4 | Applicable standard | | |
| 5 | Maximum continuous rating (in MVA) in ONAN & ONAF 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 | Magnetising current referred to H.V. AT Rated frequency | | |
| | (a) at 90% rated voltage : (in Amps) | | |

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| | | |
|----|---|--|
| | (b) at 100% rated voltage ; (in Amps) | |
| | (c) at 110% rated voltage ; (in Amps) | |
| 15 | Power factor of magnetizing current at 100% Rated Voltage & Frequency | |
| 16 | No load current at rated voltage and at rated frequency | |
| 17 | No load loss in KW at rated frequency and voltage | |
| | (a) at Lowest Tap | |
| | (b) at principal Tap | |
| 18 | (c) at highest Tap | |
| | Load loss in KW AT 75 Deg. C. at rated output and frequency | |
| | (a) at Lowest Tap | |
| 19 | (b) at principal Tap | |
| | (c) at highest Tap | |
| | Percentage Regulation at full load 75 Deg.C | |
| 20 | (a) at unity power factor | |
| | (b) at 0.8power factor lagging | |
| | Efficiencies at 75 Deg.C (I percentage) | |
| 21 | (a) at full load | |
| | (i) at unity power factor | |
| | (ii) at 0.8power factor lagging | |
| 22 | (b) at 3/4 full load | |
| | (i) at unity power factor | |
| | (ii) at 0.8power factor lagging | |
| 23 | (c) at 1/2 full load | |
| | (i) at unity power factor | |
| | (ii) at 0.8power factor lagging | |
| 24 | Impedance voltage on rated MVA base at rated current and frequency for the Principal tapping 75 Deg. C. (in percentage) | |
| 25 | (a) Reactance voltage at rated current and frequency for the principal tapping at 75 degree.C. (in percentage) | |
| | (b) resistance voltage at rated current and frequency for the principal tapping at 75 degree.C. (in percentage) | |
| 26 | Resistance at 75 Deg, C. | |
| | (a) HV at Principal Tap | |
| 27 | (b) LV | |
| | Reactance at H.V. base at 75 Deg, C. | |
| | (a) at Lowest Tap | |
| 28 | (b) at principal Tap | |
| | (c) at highest Tap | |

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| | | |
|---|---|--|
| 25 | Withstand time without injury for three phase dead short circuit at terminal (in seconds) | |
| 26 | Short time current rating for short circuitwith duration | |
| | (a) HV winding (in K.Amps) | |
| | (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) Apporximate 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 squence 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 squence 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 | Winding conductor | |
| | i) Material of the conductor | |

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| | | |
|-------|--|--|
| | (a) High voltage | |
| | (b) Low voltage | |
| | (c) LV conductor size (mm) | |
| | (d) HV conductor size (mm) | |
| | (e) HV conductor size (mm) | |
| | Conductor Area | |
| ii) | (a) High voltage (in sq. mm) | |
| | (b) Low voltage (in sq. mm) | |
| | Current density of windings at rated MVA | |
| iii) | (a) High voltage (Amp. per sq. mm) | |
| | (b) Low voltage (Amp. per sq. mm) | |
| | Insulation material used for | |
| iv) | (a) High voltage Winding | |
| | (b) Low voltage winding | |
| | Insulation material used between | |
| v) | (a) High Voltage and low voltage winding | |
| | (b) Low Voltage winding and core | |
| | Whether adjustable coil clamps are provided for H.V. & L.V. winding(if yes,details may be given) | |
| | Type of axial coil supports | |
| vi) | (a) HV winding | |
| | (b) LV winding | |
| vii) | Type of Radial Coil Supports | |
| | (a) HV winding | |
| viii) | (b) LV winding | |
| | | |
| 34 | Insulation withstand Test voltages | |
| | i) Lightning Impulse withstand test voltages (kv peak) | |
| | ii) Power frequency withstand test voltage(in kv rms for 1 min) | |

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| | | |
|----|---|--|
| | iii) Induced over voltage with stand test (in kv rms) | |
| 35 | Current in the winding at rated MVA | |
| | (a) High voltage(in Amps) | |
| | (b) Low voltage (in Amps) | |
| 36 | Voltage per turn (kv per turn) | |
| 37 | Ampere turn | |
| 38 | Number of turns | |
| | (a) High voltage | |
| | (b) Low voltage | |
| 39 | Details of tapchanger | |
| | i) Number of steps | |
| | ii) Number of Plus taps | |
| | iii) Number of minus taps | |
| | iv) Position of taps on HV | |
| | v) Type of tap changing arrangement | |
| 40 | Bushing: | |
| | i) Make | |
| | ii) Type | |
| |) Application standard | |
| | iii) Bushing: | |
| |) Lightning Impulse withstand test voltage(1.2x50 mcs in kv Peak) | |
| | iv) Power frequency with stand test voltage (in KV rms for 1 min) | |
| |) 1) Dry | |
| | a) 2) Wet | |
| | b) Creepage distance (total in mm) | |
| |) Minimum height of the bushing | |
| | Mounting | |
| | v)) | |
| | vi)) | |
| | vii)) | |
| 41 | Minimun clearance (in mm) | |
| | | |
| | i) H.V. | |

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| | | |
|-----|---|--|
| | 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) Magnetising current at knee point voltage | |
| | vii) Additional winding particulars of testing on CT | |
| | viii) Short time rating | |
| | ix) Referance standard | |
| 43 | Approximate weight of transformers in KG | |
| | i) Core with clamping | |
| | 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 | |
| | Vaccum recommended for hot oil | |
| | Vaccum to which the tank can be subjected without distortion (in torr.) | |
| | Under carriage dimensions | |
| | a) No. of directional wheels provided | |

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| | | |
|------|---|--|
| v) | iii) b) Track gauge required for the wheels | |
| |) | |
| v) | iv) Dimension of base channel (in mm x mm) | |
| | vi) Type of pressure relief device/ Explosion Vent and pressure at which operates | |
| vii) | Tank Material | |
| | 46 Conservator | |
| 46 | i) Total volume (in litre) | |
| | ii) Volume between the highest and lowest visible oil level (in ltrs) | |
| | 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 ltr) | |
| | ii) BDV value of oil | |
| | a) New unfiltered oil (KV rms) (Min) | |
| | b) After Filtration of oil (KV rms) (Min) | |
| 48 | Radiator | |
| | 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 | |
| 49 | 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 | |

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| | | |
|----|---|--|
| | v) Current rating of each contact | |
| 51 | Approximate overall dimensions (inmm) | |
| | 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(inmm) | |
| 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 | |
| 65 | Absorption index | |
| 66 | Noise Level at rated voltage | |
| 67 | Specify transport dimension | |
| 68 | Anticipated unbalanced loading | |
| 69 | Overvoltage 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:-

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

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. | TPCODL specification | | |
| 2 | Physical Verification of complete Transformer with all assembly including test rollers, radiators, cable boxes etc. and Checking of | GTP Values | TPCODL specification | | |

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| <p align="center">TPCODL TP CENTRAL ODISHA DISTRIBUTION LIMITED</p> | TATA POWER CENTRAL ODISHA DISTRIBUTION LIMITED, ODISHA | | |
| | TECHNICAL SPECIFICATION | | |
| Document Title | Specification of 12.5/16 MVA Power Transformers. | | |
| Document No. | ENG-HV | Eff. Date: 20.04.2021 | |
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| | weights, Dimensions. | | | | |
| 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/TPCODL Specification | IS : 2026 (Part III)-2009 | | |
| 10 | Test on ON-Load Tap Changer | GTP Values/TPCODL 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 | TPCODL Specification | | |
| 13 | Bushing shall be tested for Capacitance and Power factor and shall meet the manufacture's requirement. | GTP / TPCODL 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 / TPCODL Specification | TPCODL Specification | | |

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| <p align="center">TPCODL TP CENTRAL ODISHA DISTRIBUTION LIMITED</p> | <p>TATA POWER CENTRAL ODISHA DISTRIBUTION LIMITED, ODISHA</p> | | |
| | <p>TECHNICAL SPECIFICATION</p> | | |
| <p>Document Title</p> | <p>Specification of 12.5/16 MVA Power Transformers.</p> | | |
| <p>Document No.</p> | <p>ENG-HV</p> | <p>Eff. Date: 20.04.2021</p> | |
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|----|--|----------------------------|------------------------------------|--|--|
| 15 | Determination of Capacitances and dissipation factor winding-to-earth and between windings. | GTP / TPCODL Specification | IS : 2026 (Part I) cl.10.1.3 | | |
| 16 | Magnetic balance test | GTP / TPCODL 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/TPCODL specification | TPCODL | | |
| 19 | Measurement of Acoustic Noise Level | GTP/TPCODL specification | TPCODL | | |
| 20 | Measurement of the power taken by the fans | GTP/TPCODL specification | TPCODL specification | | |
| 21 | Functional tests on auxiliary equipment: i. Test on OTI and WTI ii. High Voltage test on insulation test for Auxiliary Wiring. | GTP/TPCODL specification | TPCODL specification | | |
| 22 | 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/TPCODL specification | TPCODL specification, | | |
| 23 | Temperature rise test | GTP/TPCODL specification | IS : 2026 (Part II) | | |
| 24 | Short Circuit withstand test | Should withstand | IS : 2026 (Part V) | | |
| 25 | Test to verify IP55 of Marshalling and cable boxes. | Should Confirm IP55 | TPCODL Specification | | |
| 26 | Lightning Impulse voltage test with chopped | GTP/TPCODL | IS : 2026 (Part | | |

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|  TPCODL TP CENTRAL ODISHA DISTRIBUTION LIMITED | TATA POWER CENTRAL ODISHA DISTRIBUTION LIMITED, ODISHA | | |
| | TECHNICAL SPECIFICATION | | |
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| | wave. | Specification | III) cl. 13 | | |
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PURCHASER'S OFFICER

BIDDER'S REPRESENTATIVE

DATE OF INSPECTION

TPCODL

| | | | |
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| <p align="center">TPCODL TP CENTRAL ODISHA DISTRIBUTION LIMITED</p> | <p>TATA POWER CENTRAL ODISHA DISTRIBUTION LIMITED, ODISHA</p> | | |
| | <p>TECHNICAL SPECIFICATION</p> | | |
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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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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 TPCODL, 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 TPCODL 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 on our website www.tpcentralodisha.com

3.0 CONTRACT PARAMETERS

3.1 Issue/Award of Contract

TPCODL 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.

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On receipt of the contract, the associate shall return to TPCODL 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.

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 TPCODL, 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.

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3.9 Reverse Auction

TPCODL reserves the right to conduct the reverse auction (instead of public opening of price bids) for the products / services being asked for in the tender. The terms and conditions for such reverse auction events shall be as per the Acceptance Form attached 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 TPCODL'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.

TPCODL 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 TPCODL, provide Purchaser with a reasonably detailed estimate of the cost of the change outlined in the request.

In the event, TPCODL 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 TPCODL.

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 TPCODL, packaging and forwarding charges, freight and transit insurance charges covering loading at Associate's works, transportation to TPCODL store/site & unloading & delivery at TPCODL stores/TPCODL site, cost of documentation including all the relevant test certificates and other supportive documents to be furnished.

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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 TPCODL 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 TPCODL 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 TPCODL.

6.0 TERMS OF PAYMENT

On delivery of the materials in good condition and certification of acceptance by TPCODL official, Associate shall submit the Bills/Invoices in original in the name of "The Tata Power Company Limited" to invoice desk, complete with all required documents as under:

- Test Reports (4 sets).
- MDCC issued by TPCODL.
- Packing List.
- Drawing and Catalogue.
- Guarantee/Warranty Card.
- Delivery Challan.
- O&M Manual.
- Copy of Order.
- Minutes of Meeting.

Bills/ invoices shall mention Supplier's GST Number. TPCODL will make 100% payment within 30 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 TPCODL and not on the basis of contract quantity.

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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 through crossed Cheque or RTGS whichever of the two modes chosen by the Associate, in favour of Associate’s Bank Account on TPCODL 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, TPCODL 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 TPCODL for:

- (a) 5% of the PO value if purchase order value is more than Rs 5 Crores.
- (b) 10% of the PO value if purchase order value is less than Rs 5 Crores.

This shall remain valid till the end of the Guarantee Period of contract, plus one month.

- (c) 5% of the RC value in case of Rate Contract. 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 TPCODL 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 TPCODL. 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.

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9.2 SA 8000

As TPCODL 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

TPCODL 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**

TPCODL 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 TPCODL 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

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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.

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 TPCODL/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 TPCODL.

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 TPCODL 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 TPCODL. 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 TPCODL, 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

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qualities of the bought out items without the prior written approval of the TPCODL. All such products and equipment shall be used or installed in strict accordance with original manufacturer's recommendations, unless otherwise directed by the TPCODL. 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

TPCODL 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 TPCODL during contract execution time.

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

11.2 Facilitating Inspection

The Associate shall provide all opportunities and information to TPCODL'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 TPCODL'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 TPCODL'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 TPCODL/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 TPCODL inspectors are not satisfied with the safety arrangements at the plant, TPCODL 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 TPCODL along with the inspection call, for scrutiny of TPCODL.

The Associate and TPCODL shall jointly document all the observations, comments and action points after completion of inspection and it shall be binding on the Associate to provide

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compliance on all the points requiring compliance and furnish the compliance report to the designated authority of TPCODL for receiving clearance for dispatch of materials

11.3 Third Party Nomination

TPCODL also may 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 TPCODL as far as conducting the inspection.

11.4 Waiver of Inspections

TPCODL 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 TPCODL 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 TPCODL. Material delivered at TPCODL stores or at project site without a valid MDCC issued by the designated official of TPCODL 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 TPCODL, 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.

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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 Bhubaneswar | 12 days |
| 2 | Within Bhubaneswar | 5 days |
| 3 | Waiver* | 3 working days |

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

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 TPCODL and have to supply back the material within next 30 days or within the timeframe mutually decided by Associate and TPCODL.

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 "Stores-In-Charge", TPCODL, Bhubaneswar.

12.4 Submission of mandatory documents on Delivery

Following documents shall be mandatorily submitted by BA along with supply of material to TPCODL 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 | Device data in CD as per template for metering items | Wherever applicable |

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12.5 Dispatch and Delivery Instructions

| S. No. | Instructions |
|--------|---|
| 1 | Purchase order/ Release order no. shall be mentioned on invoice and on material |
| 2 | TPCODL material code and material description shall be mentioned in invoice and on material. |
| 3 | “Property of TPCODL” 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 TPCODL, Bhubaneswar”, Guarantee period and Associate’s name. |
| 8 | In case of manual unloading, supplier / transporter shall deploy sufficient Labour for unloading the material at TPCODL central store. For heavy item(s), crane will be provided by TPCODL [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 TPCODL 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

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intended quality performance. If Associate fails to repair/rectify/replace the equipment or material supplied rendered under the contract, failed in Guarantee Period, TPCODL will be at liberty to get the same done at Associate's risks and costs and recover all such expenses plus the TPCODL'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 TPCODL. However, if replacement of the Equipment is required, Associate shall notify the same to TPCODL within 7 days of reporting the issue by TPCODL. 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, TPCODL 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 atleast 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 TPCODL, as described below:

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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, TPCODL 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 TPCODL, 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, TPCODL 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 TPCODL 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.

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 TPCODL's interest failing which appropriate action (legal or otherwise) may be taken against the Associate by the TPCODL, 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 TPCODL in connection with the performance of the contract shall be held confidential by the Associate and shall remain the property of the TPCODL 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 TPCODL.

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 TPCODL shall not be published or

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disclosed to the third parties or taken out of the country without prior written approval of the TPCODL and upon execution of confidentiality agreements satisfactory to the TPCODL 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. TPCODL 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 TPCODL. 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 TPCODL under the Contract shall be passed on to the TPCODL. The TPCODL 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 TPCODL.

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

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 TPCODL shall arise in this respect, and any costs, damages, expenses, compensation payable by TPCODL in this regard to a third party/parties, arising from a legal proceeding/s or otherwise, shall be recoverable from the Associate.

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18.0 INDEMNITY

The Associate shall at all times indemnify, keep indemnified and hold harmless the TPCODL 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 TPCODL is held liable for by any court judgement. In this connection, the TPCODL 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 TPCODL 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 TPCODL 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 TPCODL.

The TPCODL 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 TPCODL 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 TPCODL. The constituents & leader of the consortium or joint venture shall not be changed without the prior consent of TPCODL.

TPCODL 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.

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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, etc. ▪ Politically motivated sabotage, 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 Convenience

TPCODL 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 executed by Associate under the contract by providing to the Associate atleast two business days written notice for contracts having contract completion period less than sixty days and atleast 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

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- 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 TPCODL, 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 TPCODL, 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.

TPCODL 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 TPCODL and not due to any breach of contract conditions by the associate, TPCODL 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 TPCODL.

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 TPCODL 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 TPCODL 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 TPCODL 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.

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- 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 TPCODL 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 TPCODL.

If the default or breach as specified under clause 22 (except sub clause g thereof) be committed by the associate for the first time, TPCODL 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 TPCODL then TPCODL 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, TPCODL shall have the right to terminate all the contracts TPCODL is having with the Associate by issuing termination notice which shall be without prejudice to the other rights of TPCODL available to it under law.

Without prejudice to its right to terminate for breach of contract, TPCODL 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 TPCODL having proceeded 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 TPCODL.
- 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 TPCODL sites or in transit thereto. However the associate shall continue to fulfill its contractual obligations with regard to the part of contract not terminated.

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- d) It shall be open for TPCODL 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 TPCODL 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 TPCODL 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 TPCODL 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, TPCODL 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 TPCODL 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 TPCODL 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 TPCODL against the amount recoverable from him on this ground. The same shall be without prejudice to other rights available to TPCODL 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 , TPCODL shall be entitled to bar the associates its agents , affiliates from undertaking any negotiation / tendering, bidding , participation activities concerning TPCODL for a period of two years from date of such termination. The same shall be without prejudice to other rights available to TPCODL.

22.2 Termination for Convenience of Associate

Associate at its convenience may request for termination of contract, clearly assigning the reason for such request. TPCODL 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 TPCODL

TPCODL at its sole discretion may terminate the contract by giving 30 days prior notice in writing or through email to the Associate. TPCODL 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.

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23.0 DISPUTE RESOLUTION & ARBITRATION

In case of any dispute or difference the parties shall endeavour 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 Bhubaneswar. 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 TPCODL or suspended by the arbitrator. Further, TPCODL 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 Bhubaneswar 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 TPCODL or not. However any error in design/drawing arising out of any incorrect data/written information from TPCODL 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 TPCODL on acceptance of material by store/site after Inspection.

However, such passing of title of ownership and property to the TPCODL 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.

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27.0 INSURANCE

The Contractor 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 TPCODL.
- b) TPCODL 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. TPCODL 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 TPCODL 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) TPCODL 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 TPCODL'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 TPCODL 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. TPCODL, 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/repared by them without any extra cost to TPCODL and without affecting the completion time.

28.0 SUGGESTIONS & FEEDBACK

We welcome all our Business Associates to write to us about their experience with TPCODL; 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 log on to our website www.tpcentralodisha.com to provide your feedback.

- Suggestions for us
- Feedback form
- Knowledge Sharing/ Experience with TPCODL

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- Any issues with TPCODL.

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 lodged by log on to our website www.tpcentralodisha.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 |

| | | |
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ANNEXURE-A

PROFORMA FOR BID SECURITY BANK GUARANTEE

**The TP Central Odisha Distribution Limited
Bhubaneswar**

WHEREAS, (Name of the Bidder) _____
(hereinafter called "the BIDDER") has submitted his bid dated _____ for the
(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 The
TP Central Odisha Distribution Limited (TPCODL) in the sum of _____
for which payment well and truly to be made to the TPCODL 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 TPCODL 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 TPCODL upto the above amount upon receipt of its first written demand, provided that in its demand the TPCODL 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 upto 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)

| | | |
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ANNEXURE- B

PROFORMA FOR PERFORMANCE BANK GUARANTEE (CP cum EP)

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

- a) Format shall be followed in toto
- 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

The TP Central Odisha Distribution Limited

Bhubaneswar

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 by

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your exercising any of your rights with reference to matters aforesaid or any of them or by reasons of any other act or forbearance or other acts of omission or commission on your part or any other indulgence shown by you or by any other matter or thing whatsoever which under the law would, but for this provision have the effect of relieving our bank from its obligation 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 Bhubaneswar branch and claim will also be payable at Bhubaneswar Branch (to be confirmed by Bhubaneswar Branch by a letter to that effect in case BG is from the branch outside Bhubaneswar).
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

| | | |
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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 TPCODL 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 TPCODL, in respect of our aforesaid Order No _____ dated _____ including amendments, if any, issued by TPCODL to our entire satisfaction and we further confirm that we have no claim whatsoever pending with TPCODL 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 TPCODL, with full knowledge and with our free consent without any undue influence, misrepresentation, coercion etc.

Place

Name

(Company Seal)

| | | |
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ANNEXURE-D

**PROFORMA FOR APPLICATION FOR ISSUANCE OF CONSOLIDATED TDS
CERTIFICATE**

To be printed on the letterhead

To,

The TP Central Odisha Distribution Limited,
Bhubaneswar

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 "TPCODL addressed - attached envelop"

You are associated with us as

- OEMs Service Contractor Material Suppliers 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

- Bhubaneswar Within 200 kms from Bhubaneswar More than 200 kms from Bhubaneswar

Your nearly turnover with TPCODL

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

Additional Information

| | |
|--------------------------|--|
| Your Name | |
| Your Designation | |
| Your Organization | |
| Contact Nos. | |
| Email | |

We once again thank you for your participation in this survey. Please spare 10 minutes to give your feedback on following pages (Section A to E)

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 | In 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 | TPCODL demonstrate willingness to be flexible in administration of Contract / Purchase Order | | | | | | |
| 7 | We provide timely responses / clarifications to your queries | | | | | | |
| 8 | TPCODL representative you interact / coordinate with is adequately empowered to support you in meeting contractual obligations | | | | | | |
| 9 | TPCODL provide you all necessary infrastructure support for timely and quality completion of work (including AMC) | | | | | | |
| 10 | TPCODL Engineer-in-Charge timely certifies the jobs executed/ material supplied | | | | | | |
| 11 | TPCODL Engineer-in-Charge efficiently supervises the job execution for timely completion of job | | | | | | |
| 12 | BIRD (Bill Inward Receipt Desk) initiative has improved payment disbursement process | | | | | | |

| S. No. | Parameters | 1 | 2 | 3 | 4 | 5 | Remarks/ Suggestion |
|--------|--|--------------|-----------------------|-------------------|---------------------|-------------|------------------------|
| | | Do Not Agree | Slightly in Agreement | In Fair Agreement | Mostly in Agreement | Fully Agree | |
| 13 | Our approach for Inspection and Quality Assurance effective to expedite project completion? | | | | | | |
| 14 | TPCODL never defaults on contractual terms | | | | | | |
| 15 | In TPCODL 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 | TPCODL Employees follow Ethical behaviour | | | | | | |

GENERAL CONDITIONS OF CONTRACT

SECTION – B

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 TPCODL employees you interact with from following team? | | | | | | |
| 1.1 | Project Engineering | | | | | | |
| 1.2 | District / Zones | | | | | | |
| 1.3 | Projects/HOG (TS &P) | | | | | | |
| 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 TPCODL in comparison to your other clients in terms of fairness of treatment and transparency with its Business Associates? | | | | | | |
| 3 | How would you rate TPCODL in comparison to your other clients in terms of processes and systems to manage partnership with its Business Associates | | | | | | |
| 4 | How would you rate TPCODL 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 TPCODL, would you like to continue your relationship with TPCODL? | | | | | |
| 2 | If someone asks you about TPCODL, would you talk "positively" about | | | | | |

| | | | | | | |
|---|---|--|--|--|--|--|
| | TPCODL? | | | | | |
| 3 | Would you refer TPCODL 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 TPCODL, that truly represents your overall satisfaction with us (please tick appropriate box) -

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|----|

SECTION - E

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

Please spare your thoughts for TPCODL'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 TPCODL to adopt. Please give your valuable salient recommendations.

Please spare your thoughts for TPCODL'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 TPCODL) | <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!!

| | | |
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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, TPCODL intends to use the reverse auctions through SAP-SRM tool as an integral part of the entire tendering process. All the bidders who are found as technically qualified based on the tender requirements shall be eligible to participate in the reverse auction event.

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

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

Signature & Seal of the Bidder

| | | |
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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 TPCODL well in time at our own. Further, we kept TPCODL 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)

| | | |
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ANNEXURE-H
VENDOR APPRAISAL FORM

| TO BE SUBMITTED BY VENDOR (To be filled as applicable) | | | |
|---|---|--|---|
| VENDOR: | | | |
| 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 TELEGRAPHIC ADDRESSES, TELEX NO. FAX NO. | : |
| | 1.5 | LOCATION OF MANUFACTURING UNITS | : |
| | | i) UNITS 1 | : |
| | | ii) OTHER UNITS | : |
| 2.0 | PRODUCTS MANUFACTURED | | |
| 3.0 | TURNOVER DURING THE LAST 3 YEARS (TO BE VERIFIED WITH THE LATEST PROFIT & LOSS STATEMENT). | | |
| 4.0 | VALUE OF FIXED ASSETS | | |
| 5.0 | NAME & ADDRESS OF THE BANKERS | | |
| 6.0 | BANK GUARANTEE LIMIT | | |
| 7.0 | CREDIT LIMIT | | |
| 8.0 | TECHNICAL | | |
| | 8.1 | NO. OF DESIGN ENGINEERS (INDICATE NO. OF YEARS EXPERIENCE IN RELATED FIELDS) | : |
| | 8.2 | NO. OF DRAUGHTS MEN | : |
| | 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 / | : |

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| | | 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 | : |
| | | UTILIZED | : |
| | | STANDBY POWER SOURCE | : |
| | 9.3 | MANUFACTURING FACILITIES (ATTACH LIST OF EQUIPMENT AS APPLICABLE) | : |
| | | 9.3.1 MATERIAL HANDLING | : |
| | | 9.3.2 MACHINING | : |
| | | 9.3.3 FABRICATION | : |
| | | 9.3.4 HEAT TREATMENT | : |
| | | 9.3.5 BALANCING FACILITY | : |
| | | 9.3.6 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 | : |

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| | 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 RECOGNIZED 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 ORGANIZATIONAL 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 | |
| 17.0 | | ORGANIZATIONAL DETAILS 1. PF NO 2. ESI NO 3. INSURANCE FOR WORK MAN COMPENSATION ACT NO 4. ELECTRICAL CONTRACT LIC NO 5. ITCC / PAN NO 6. SALES TAX NO 7. WC TAX REG. NO | : |
| 18.0 | | DOCUMENTS TO BE ENCLOSED: | |

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|--|--|--|
| | <ol style="list-style-type: none"> 1. FACTORY LICENSE 2. ANNUAL REPORT FOR LAST THREE YEARS 3. TYPE TEST REPORT FOR THE ITEM 4. PAST EXPERIENCE REPORTS 5. ISO CERTIFICATE –QMS, EMS, OHAS, SA 6. REGISTRATION OF SALES TAX 7. COPY OF TIN NO. 8. COPY OF SERVICE TAX NO. 9. REGISTRATION OF CENTRAL EXCISE 10. COPY OF INCOME TAX CLEARANCE. 11. COPY OF PF REGISTRATION 12. COPY OF ESI REGISTRATION 13. COPY OF INSURANCE FOR WORK MAN COMPENSATION ACT NO 14. COPY OF ELECTRICAL CONTRACT LIC NO 15. COPY OF PAN NO 16. COPY OF WC TAX REGISTRATION 17. DOCUMENTS IN SUPPORT OF SC/ST RELAXATION AT S.NO.16.0 18. GSTN CERTIFICATE | |
|--|--|--|

*** 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).

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

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ANNEXURE-I
MANUFACTURER AUTHORIZATION FORM

(To be submitted on OEM's Letter Head)

Date:

Tender Enquiry No.:

To,
Chief (Procurement & Stores)
The TP Central Odisha Distribution Limited,
Bhubaneswar

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.

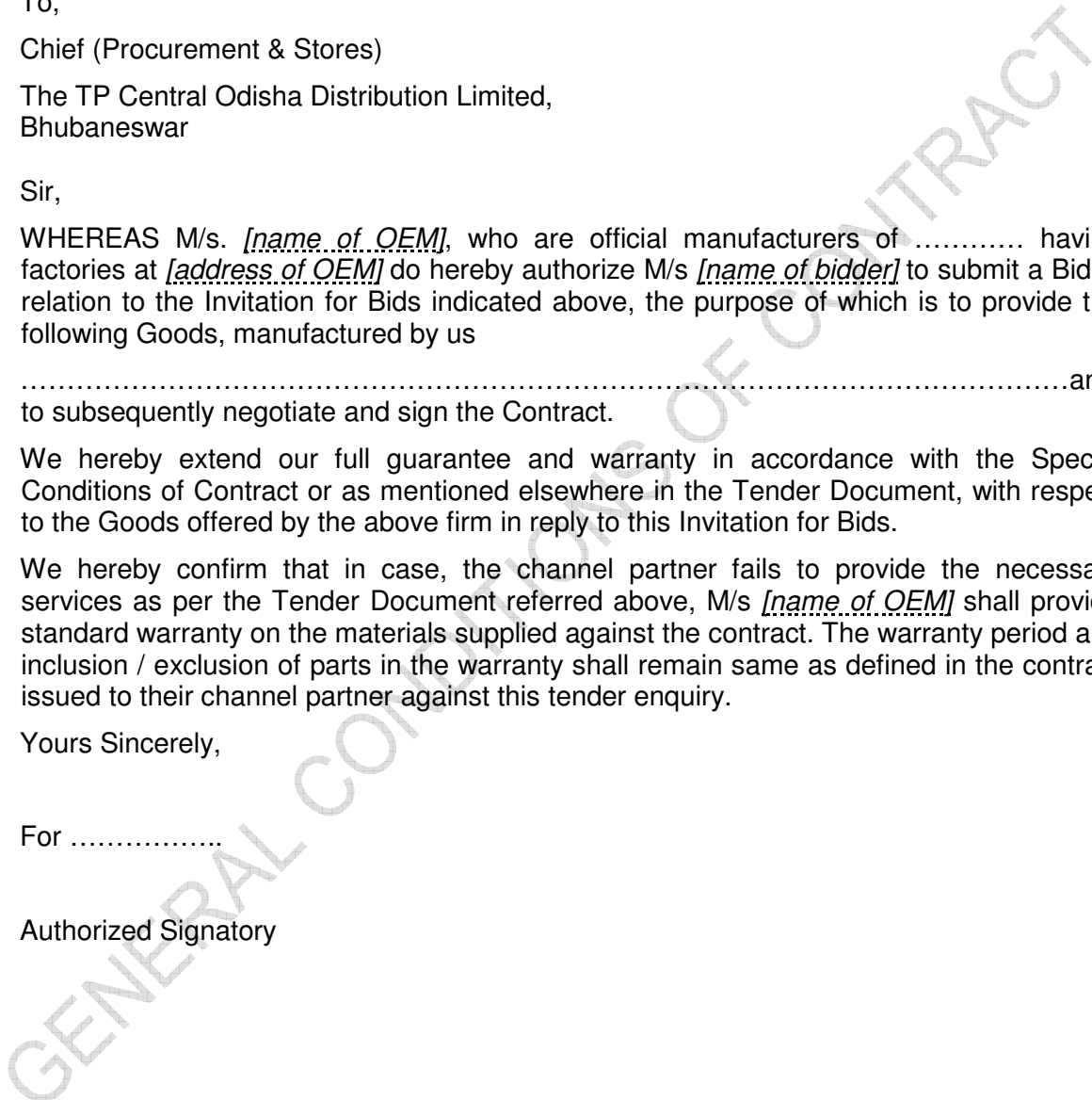
We hereby extend our full guarantee and warranty in accordance with the Special Conditions of Contract or as mentioned elsewhere in the Tender Document, with respect to the Goods offered by the above firm in reply to this Invitation for Bids.

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



The Tata Power Company Ltd




Safety Terms and Conditions

*Document No.
TPSMS/GSR/STC/009 REV 02*

*Date of Issue:
19/01/2019*

Safety Terms and Conditions

| | | |
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| The Tata Power Company Ltd |  | <i>Safety Terms and Condition</i> |
| <i>Document No. TPSMS/GSR/STC/009 REV 02</i> | | <i>Date of Issue: 19/09/2019</i> |

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1. Definitions

- 1.1 **Order Manager:** Order Manager is the Tata Power representative, who has the ownership of the given job under the signed contract.
- 1.2 **Service Provider/Contractor/vendor:** An individual or an organization that provides services to Tata Power under a signed contract.
- 1.3 **Site Safety Management Plan:** It is the safety plan agreed between Contractor /service provider & Tata Power. It will contain the entire job specific safety requirement and will be signed by the service provider.
- 1.4 **High Risk Job:** Any job which has significant health and safety risk associated to it. The list of high risk jobs has been identified at Tata Power level.
- 1.5 **Emergency:** a serious, unexpected, business discontinuity and often dangerous situation resulting loss of revenue/property and requiring immediate action.

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2. Safety Policy





HEALTH AND SAFETY POLICY

Tata Power is committed to provide safe and healthy working environment for the prevention of work related injuries and ill-health. Safety is one of our core values. We strive to be a leader in safety excellence in the global power and energy business. In pursuit of this, we are committed to the following:

- Maintain and continually improve our management systems to eliminate hazards and reduce health & safety risks to all our stakeholders.
- Incorporate appropriate health & safety criteria into business decisions for selection of plant and technology, performance appraisal of individuals and appointments in key positions.
- Comply and endeavour to exceed all applicable health & safety legal and other requirements
- Integrate health & safety procedures and best practices into every operational activity with assigned line-functional responsibilities at all levels.
- Involve our employees and business associates in maintaining a safe and healthy work environment through consultation and participation
- Inculcate safety culture by visible leadership and empowerment.
- Ensure required competency to enable our employees and business associates for working safely.
- ▶ Promptly report incidents, investigate, share crucial learnings and prevent recurrences.
- Influence our business associates in enhancing their health and safety standards and align with Tata Power's health & safety codes and practices.
- Set safety & health metrics as indicators of excellence, monitor progress and continually improve health and safety performance.

We shall ensure the availability of appropriate resources at all times to fully implement and communicate this policy to all stakeholders by suitable means and periodically review its relevance in continuously changing business environment.

Date: 11th March, 2019

 Lighting up Lives!


 (Praveer Sinha)
 CEO & Managing Director



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3. Safety Organization & Responsibilities

4.1 Contractor Site Management and Supervision

Each Contractor will be responsible for fulfilling all statutory and safety requirements as per the laws of the land and not limited to Factory Act, Electricity Act, Electricity Rules and Regulations, Shop and Establishment Act etc.


Each Contractor shall provide at least one competent full time safety supervisor for workforce of less than 100 numbers. When workforce ranges from 100 to 1000, the contractor has to provide at least one qualified safety officer and safety supervisors (reporting to the safety officer) in the ratio 1:100. For every 1000 addition in workforce, the contractor has to add 1 safety officer. The Tata Power Project Safety Manager will review and approve the appointment of all safety supervisors. Contractor/Subcontractor safety supervisors/officers will work with Tata Power Safety Managers and align themselves with Tata Power safety requirements.

Each Contractors'/Subcontractors' Site Manager is responsible, and will be held accountable, for the safety of their sub contractors and workforce and for ensuring that all equipment, materials, tools and procedures remain in safety compliance at job site, including:

- 4.1.1 Holding officer/supervisors accountable for safety and actively promote safe work performance.
- 4.1.2 Participate in and cooperate with all safety program requirements to be implemented in order to meet Tata Power safety objectives.
- 4.1.3 Ensure timely reporting of safety incidents, near misses, unsafe acts and conditions.
- 4.1.4 Identify the training needs of its employees and maintain all safety training documents.
- 4.1.5 Provide safety performance report at an agreed frequency.
- 4.1.6 Stopping of unsafe work (acts and/or conditions) immediately, until corrective action be taken.

4.2 Contractor Supervisors and General Staff

Contractors' site supervisors and general staff members in charge of job site functions such as field engineering, warehousing, purchasing, cost and scheduling, etc. are responsible for the safe performance of the work of those they supervise. They must set an example for their fellow employees by being familiar with applicable sections of the Site Safety program and ensuring that all site activities are performed with SAFETY as the primary objective.

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Each site supervisor is responsible and will be held accountable for identifying, analyzing and eliminating or controlling all hazards through implementation of an aggressive, pro-active Health, Safety and Environmental Program from project inception through project completion. Each supervisor will proactively participate in the SHE program by observing, correcting unsafe acts, and recording these observations.

4.3 Contractor Workforce

Contractor workforce must make safety a part of their job by following safety rules and regulations and by using all safeguards and safety equipments. They must take an active part in the Site Safety program to ensure their own safety and injury-free employment as well as being alert to unsafe practices of their fellow employees.

Every member of the workforce is expected to report for work without influence of any Drug/Alcohol. All employees are expected to report any hazardous conditions practices and behaviors in their work areas and correct where ever possible.

Workforce is responsible for active participation in safety and health programs, suggestion systems, trainings and in immediate reporting of all injuries, any unsafe practices, conditions or incidents to their supervisors.

4.4 Vendor/Contractor

Vendors/Contractor shall at all times comply with, and ensure that their workforce comply with all site safety rules and regulations. Specifically, with applicable provisions of the Tata Power Site Safety Management Plan, and all statutory safety rules and regulations.

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4. Site Safety Rules and Procedures:

The work in the safest possible manner can only happen when it has been carefully planned and all applicable procedures are followed. The Tata Power Safety Procedures are derived from Tata Power best practices and the applicable Government acts regulations. In each case, the most stringent regulation is used.

Following is the list of Tata Power’s critical Safety Rules and Procedures. Contractor shall refer to approved Rules and Procedures for detailed requirements and ensure conformance.

5.1 Lock Out and Tag Out Procedure


This procedure is intended to be used for the protection of Personnel while servicing or performing maintenance on equipment / pipeline / vessel / process systems. This is a general procedure that shall be used as the minimum requirements for isolation of equipment, pipelines, machines, system from all possible sources of hazardous energy and / or material such as Steam, Hot Water, Compressed Air, any other process fluid / chemical energy /Mechanical energy or Electrical energy. For complete procedure kindly refer Procedure Document No. TPSMS/CSP/LOTO/001 REV 01 available on official website of Tata Power (www.tatapower.com)

5.2 Excavation Safety (Shoring and Sloping) Procedure

This procedure is developed to cover the safe practices required for shoring and sloping in excavation and trenching jobs. This procedure is developed to establish mandatory requirements for practices to protect personnel, property and equipment from hazards associated with above activities. For complete procedure kindly refer Procedure Document No TPSMS/CSP/EXS/002 REV 01 available on official website of Tata Power (www.tatapower.com)

5.3 Confined Space Entry Procedure

This procedure outlines the steps required to perform the confined space entry and to protect personnel from the hazards of entering and conducting operations in confined spaces. For complete procedure kindly refer Procedure Document No –TPSMS/CSP/CSE/003 REV 01 available on official website of Tata Power (www.tatapower.com)

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5.4 Working at Height Procedure

This procedure describes the rules and procedures to protect employees from the hazards of working at heights.

This procedure is developed to cover the safe practices required for Working at Heights. This procedure is developed to establish mandatory requirements for practices to protect personnel from hazards associated in this area. For complete procedure kindly refer Procedure Document No –TPSMS/CSP/WAH/004 REV 01 available on official website of Tata Power (www.tatapower.com)

5.5 Heavy Equipment Movement Safety Procedure


Heavy equipment lifting and movement is an activity involving loading, unloading, storage and movement from one place to another including lifting and erection or repairing of equipment with cranes or hoists. Material, machinery and equipment handling operations are being carried out by large capacity cranes and hoists, which make the job safer and faster. This procedure addresses the hazards and precautions associated with such equipment and their use. For complete procedure kindly refer Procedure Document No –TPSMS/CSP/HEMS/005 REV 01 available on official website of Tata Power (www.tatapower.com)

5.6 Mobile Crane Safety Procedure

Mobile cranes are responsible for many incidents, injuries. Falling loads from mobile cranes pose a severe hazard to operators and nearby workers and property. Many types of cranes, hoists, and rigging devices are used for lifting and moving materials. To maintain safe, appropriate standards has to be adhered to and only qualified and licensed individuals shall operate these devices. For complete procedure kindly refer Procedure Document No –TPSMS/CSP/MCS/006 REV 01.

5.7 Scaffold Safety Procedure

This procedure is developed to provide information on the safe erection, use, dismantling and maintenance of access scaffolding in the workplace. It is developed to establish mandatory requirements for practices to protect personnel from hazards associated with erection, use and dismantling of scaffolds. For complete procedure kindly refer Procedure Document No –TPSMS/CSP/SCAF/007 REV 01 available on official website of Tata Power (www.tatapower.com)

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5.8 Electrical Safety Procedure

The objective of these standards is to specify minimum mandatory requirements and advisory guidance for identifying and controlling hazards to ensure 'Zero Harm' with regard to operation maintenance and testing of electrical equipment. For complete procedure kindly refer Procedure Document No- TPSMS/CSP/ELEC/010 REV 01 available on official website of Tata Power (www.tatapower.com)

5.9 Job Safety Analysis (JSA) Procedure

This objective of this procedure is to have a task based risk assessment process in place that identifies, evaluates and controls the risks associated with work activities, and as a result, prevents those involved in the task or those potentially affected by the task, from being harmed. For complete procedure kindly refer Procedure Document No- TPSMS/CSP/JSA/009 REV 01 available on official website of Tata Power (www.tatapower.com)

5.10 Fire Safety Management Procedure

Objective of This standard is to specify the minimum mandatory requirements and advisory guidelines to ensure prevention of fire related incidents and managing / controlling their impacts if they do occur. For complete procedure kindly refer Procedure Document No- TPSMS/CSP/FSM/011 REV 01

5.11 Permit To Work Procedure

Given the inherent hazards of the power generation and distribution industry, a significant number of TATA POWER operations and installations are critical. Work Permit (WP) System is an essential element in controlling the workplace risks in an effective manner. For complete procedure kindly refer Procedure Document No –TPSMS/CSP/PTW/008 REV 01 available on official website of Tata Power (www.tatapower.com)

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5.12 Lift (Elevator) Safety Procedure

To provide safe operating procedure for taking control of lift car before entering and existing the pit of OTIS make elevators. For complete procedure kindly refer Procedure Document No – TPSMS/GSP/LIFT/001 REV 01 available on official website of Tata Power (www.tatapower.com)

5.13 Working on conveyor belt Procedure

This procedure is developed to cover the safe practices required for Working on live equipment and to protect personnel from hazards associated with it. For complete procedure kindly refer Procedure Document No – TPSMS/GSP/CONV/002 REV 01 available on official website of Tata Power (www.tatapower.com)

5.14 Handling Hazardous Materials Procedure

This Procedure is developed to provide procedure for recycling and / or safe disposal of used / waste batteries in compliance with all legislation. For complete procedure kindly refer Procedure Document No-TPSMS/GSP/HAZM/003 REV 01 available on official website of Tata Power (www.tatapower.com)

5.15 Material Handling and Storage Procedure

The purpose of this document is to provide procedures to assist the safe handling of materials (manual handling and mechanical handling). For complete procedure kindly refer Procedure Document No – TPSMS/GSP/MATL/004 REV 01 available on official website of Tata Power (www.tatapower.com)

5.16 Contractor Safety Management Procedure

The purpose of this document is to engage with contractors in a way to create safe work environment for everyone working for Tata Power. For complete procedure kindly refer Procedure Document No – TPSMS/GSP/CSM/015 REV 01 available on official website of Tata Power (www.tatapower.com)

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The above procedures will be updated periodically and the updated version of the procedures as well as any additional critical procedure will be available on official website of Tata Power (www.tatapower.com) for your reference.

5. Training and Capability Building

Safety Training and capability building of workforce is a major component of safety management program. All training required must be provided and documented as specified by Tata Power and Indian Regulations. Tata Power Safety Manager will audit contractors training and related documentation to assure its adequacy.

6.1 Tata Power Site Safety Orientation

All Tata Power contractor and subcontractor workforce is required to attend Tata Power Site Safety Orientation Training to receive a Safety Training Card, which is required to obtain a Gate Pass to the site, prior to entry.

This Safety Orientation Course will be for duration of minimum half day. The information provided during the orientation will include, but is not limited to following:

1. Job rules, personal safety and conduct
2. Hazards reporting
3. Reporting of injuries
4. Emergency procedures
5. Safety Activities and Program including disciplinary measure and incentives.
6. Critical safety procedure relevant to the job

6.2 Capability Building

Appropriate training such as L1, L2 & L3 is given to ensure that a jobholder, either supervisor or worker, is competent to do his/her job safely. The skill training is provided through TPSDI and other agencies authorized by Tata Power on the list of 15 procedures mentioned under safety procedure.

Contractor shall ensure that concerned workmen are provided with adequate training before he/she is allowed to execute the work.

An evaluation test will be conducted after the completion of the training. Those workmen employee who meet the minimum required competency will be provided with Gold Card which is valid for 3 years, post which the workmen has to reappear for the assessment. If the workman is not able to qualify the assessment, he/she will be given 3 additional attempts to clear in 3 month timeframe failing which he/she will not be allowed to work on high risk jobs.

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6. Pre Employment and Periodic Medical check up

Contractor shall arrange to conduct a pre employment and periodic medical check-up for its entire workforce by Tata Power medical officer or Tata Power authorized medical officer. The contractor shall be able to produce the certificate prior to the employment. The contractor shall also organize to conduct periodical medical checkup (six monthly) for the following category of employees:

- Drivers (Check for Vision & Hearing)
- Equipment Operators (Check for Vision & Hearing)
- Workforce working at Height (Check for Vision, Hearing, Vertigo & Height Phobia)
- Workforce Handling the hazardous substances (Coal, ash and chemicals)
- Workforce in high decibel area (> 90 Decibel, Check for Hearing)
- Workforce, working in specific areas requiring specific medical attention should conduct the medical test as laid down in the respective Site Safety Management Plan.

7. Safety Performance Evaluation and Penalties

8.1 A certain percentage of the bill value will be retained against every running bill as safety performance retention. The amount will be released with the last invoice based on "Safety Performance score" attached in CSM-F-3 of CSM procedure. The amount is based on following table

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

8.2 Safety performance Score will be monitored by the Order Manager every month.

8.3 For the contract value of more than Rs 1 Cr or contract duration more than 12 months, the retention amount shall be released half yearly based on safety performance. For all remaining contracts, the retention amount will be released with the final bill.

8.4 In case of job stoppage due to safety violations/ unsafe observations at the site, no time extension shall be given to the contractor, if such delays are attributable to contractor.

| | | |
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- 8.5 In case of fatality, limb loss or loss of property, vendor has to pay for liability, legal, statutory and additional mutually agreed settlement charges imposed by the appointed committee. This charge is over and above the retention amount.
- 8.6 The committee will finalize an amount between 5 -50 lakhs based on factors such as advise by statutory authorities, contract value and impact of accident etc.
- 8.7 Safety performance bonus 1% (limiting to 50 lakhs) of the invoice value will be considered at the end of the job if the contractual safety performance score is 100%.
- 8.8 During the progress of the work, concerned Supervisor/Engineer will visit and inspect the work site regularly and evaluate the safety performance of the contractor based on matrix attached herewith.
- 8.9 Order Manager, divisional chief and SBU head have the authority to terminate the contract in case of three consecutive serious violations.

Safety Performance Evaluation - CSM-F-3

| | <u>Lead Indicators</u> | Unit Of measurement | Target | weight age |
|---|---|--------------------------------|---------------|-------------------|
| 1 | % of Employee certified in TPSDI/Authorized agency | % | 50 | 10 |
| 2 | CFSA score (Annexure 6.1) | Average Severity of Violations | 1.49 | 20 |
| 3 | Monthly inspection completed for Critical Equipments, lifting Tools & Tackles and hand tools used at site | % | 80 | 5 |
| 4 | Condition of tools, tackles and equipments | % | 100 | 15 |
| | <u>Lag Indicators</u> | | | |
| 1 | Number of Fatalities | No. | 0 | 30 |
| 2 | Number of Lost work day case (LWDC) | No. | 0 | 10 |
| 3 | Man-days Lost | No. | 0 | 10 |


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In addition to above evaluation criteria, for specific violations penalty shall be imposed on the contractors under following circumstances:

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

| Sr No | Description of violation | Severity | Penalty / |
|--------------|--|-----------------|------------------|
| 35. | Undercut / cave-in found on sides of excavated pits | 4 | 2000/ |
| 36. | Grinding wheel/ Coupling/ Piling winch/other rotating parts without guard | 4 | 2000/ |
| 37. | The HVM/Mobile Crane operator does not having a valid HVM driving license. | 4 | 2000/ |
| 38. | The loading area is not leveled properly. | 4 | 2000/ |
| 39. | Ladder not anchored at top | 4 | 2000/ |
| 40. | Opening found in working platform of scaffolding/floor | 4 | 2000/ |
| 41. | Inadequate illumination at the working area | 4 | 2000/ |
| 42. | Loose material lying on Gantry ,platform | 4 | 2000/ |
| 43. | Cleaning body with Compressed Air. | 3 | 500/- |
| 44. | Gas Cylinders using without cap. | 3 | 500/ |
| 45. | Gas Cylinders stored without securing | 3 | 500/ |
| 46. | Bringing inside any other chemicals, apart from approved by Safety dept. | 3 | 500/ |
| 47. | Using drum for sitting or accessing height. | 3 | 500/ |
| 48. | Misusing emergency facilities like fire hydrant line/ hose box/ spray system/ eye wash etc. | 3 | 500/ |
| 49. | No provision of Safety net where falling materials or tools may occurs | 3 | 500/ |
| 50. | Taking electrical supply from non designated outlet (other than socket). | 3 | 500/ |
| 51. | Restricted gangways due to unwanted materials. | 3 | 500/ |
| 52. | Not reporting incident. | 3 | 500/ |
| 53. | Entering into restricted area like switch yard/ hazardous storage etc. | 3 | 500/ |
| 54. | Work without supervision | 3 | 500/ |
| 55. | Parking of vehicle without applying wheel choke at right front-front and left rear-rear wheels other than passengers cars. | 3 | 500/ |
| 56. | Vehicle without helper or co-driver. | 3 | 500/ |
| 57. | Not wearing florescent safety jacket at site. | 3 | 500/ |
| 58. | People travelling in load body of vehicle. | 3 | 500/ |
| 59. | Parking of vehicles at non designated area. | 3 | 500/ |
| 60. | Shifting heavy materials without guide ropes. | 3 | 500/ |
| 61. | Using other than 24V lamp inside the confined space/Use of other than 24V lamps. | 3 | 500/ |
| 62. | Angular/ starch loading/ lifting with Crane or hoist. | 3 | 500/ |
| 63. | By passing the limit switch/ Safety Interlock. | 3 | 500/ |
| 64. | Housekeeping activities on road without proper barricade. | 3 | 500/ |

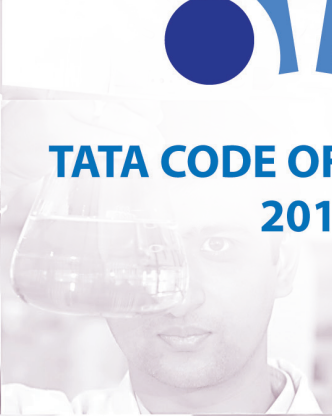
| Sr No | Description of violation | Severity | Penalty / |
|--------------|--|-----------------|------------------|
| 65. | Trying to board or alit from running vehicle. | 3 | 500/- |
| 66. | Cylinder Valves of Gas cylinders not closed when not in use. | 3 | 500/- |
| 67. | Flash-back arrester not used. | 3 | 500/- |
| 68. | Trolley wheel found damaged. | 3 | 500/- |
| 69. | Guy ropes of required length on both sides of object are not used during movement with load. | 3 | 500/- |
| 70. | Scotch block/wedge not provide when the vehicle is parked. | 3 | 500/- |
| 71. | Suitable Trolley not provided to hold the cylinders. | 3 | 500/- |
| 72. | Locked First Aid box | 3 | 500/- |
| 73. | Caution boards, danger signs (luminescent /red) along with emergency contact number are not found displayed. | 3 | 500/- |
| 74. | Person found jumping barricading tape | 3 | 500/- |
| 75. | Stacking of pipes, pile casing , drums without chock blocks/wedges | 3 | 500/- |
| 76. | The terrain on which Heavy Equipment/Machinery moves is not reasonably hard. | 3 | 500/- |
| 77. | Without Safety Helmet at working sites | 4 | 250/- |
| 78. | Without Crash Helmet (on bikes) | 4 | 500/- |
| 79. | Without Full body double lanyard Safety Harness (for work at height) | 5 | 5000/- |
| 80. | Without Hand gloves - Material Handling, Welding, Cutting, | 4 | 100/- |
| 81. | Without Safety goggles/ face shield - Welding/Cutting /Grinding | 5 | 5000/- |
| 82. | Handling Chemical without PVC Apron | 5 | 5000/- |
| 83. | Smoking in prohibited area (Closed Go-downs, Storage of flammable material, Storage of Gas cylinders) | 5 | 1000/- |
| 84. | Sleeping at Work Place | 3 | 100/- |
| 85. | Driving beyond speed limit | 3 | 1000/- |
| 86. | Seat Belt While Driving (for front seat passengers and driver) | 3 | 500/- |
| 87. | Driving without license | 4 | 1000/- |
| 88. | Heavy Commercial vehicles without reverse horn | 3 | 500/- |
| 89. | Non functional Head light/ tail light and side indicators | 3 | 100/- |
| 90. | Using Mobile Phone During Driving | 5 | 5000/- |
| 91. | Poor visibility of registration number/ without registration number | 3 | 100/- |
| 92. | Broken/ without Side view mirror | 3 | 100/- |
| 93. | Over speeding above specified limit | 3 | 500/- |
| 94. | Broken/ Without Pressure gauge on Oxygen/ LPG / Acetylene cylinder. | 3 | 500/- |

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| Sr No | Description of violation | Severity | Penalty / |
|--------------|--|-----------------|----------------------|
| 95. | Without Flash back arrestor on Industrial Acetylene & Oxygen cylinders. | 5 | 5000/- |
| 96. | Spillage of hazardous material/chemicals during transportation | 4 | 2000/- |
| 97. | Electrical equipment without Earthing/ ELCB/ Double Insulation Cable. | 5 | 5000/- |
| 98. | Lifting Tools & Tackles used without/ expired Test Certificates. | 5 | 5000/- |
| 99. | Housekeeping repeatedly not maintained | | |
| 100. | <ul style="list-style-type: none"> • First Time | 3 | Warning |
| 101. | <ul style="list-style-type: none"> • Second Time | 4 | 1000/- |
| 102. | <ul style="list-style-type: none"> • Third Time | 5 | 5000/- |
| 103. | Serious Violation Of House Keeping (after 1 st or 2 nd warning to be decided by Project Manager depending on the severity) | | Rs.10000/- and above |
| 104. | Repeat Violation of same nature | 5 | 5X Violation |



**TATA CODE OF CONDUCT
2015**



LEADERSHIP THAT INSPIRES

For over 100 years, the Tata group has been led by visionaries who have stayed true to the vision of the founder, Jamsetji Tata.

A vision that placed the greater good of society at par with business growth.

A vision that put into practice pioneering social initiatives that changed the way responsible business was run.

And a vision that brought into the group a strong social conscience.



We do not claim to be more unselfish, more generous or more philanthropic than other people. But we think we started on sound and straightforward business principles, considering the interests of the shareholders our own, and the health and welfare of the employees, the sure foundation of our success.

Jamsetji Tata
Founder of the Tata group
Chairman (1868 – 1904)

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FOREWORD

Tata companies have consistently adhered to the values and ideals articulated by the Founder for over 150 years. The Tata Code of Conduct was first formalized by Mr Ratan Tata. It articulates the Group's values and ideals that guide and govern the conduct of our companies as well as our colleagues in all matters relating to business. Today, the Code is a bedrock on which we base our individual, as well as leadership commitments to core Tata values.

The Tata Code of Conduct outlines our commitment to each of our stakeholders, including the communities in which we operate, and is our guiding light when we are sometimes faced with business dilemmas that leave us at ethical crossroads. The Code is also dynamic in that it has been periodically refreshed in order to remain contemporary and contextual to the changes in law and regulations. However it remains unaltered at its core.

Our stellar reputation and success as a business entity has been defined by the powerful commitment and adherence to the core values and principles expressed in this Code, by all our employees, directors and partners. I trust every Tata colleague and Tata company will continue to not only comply with the laws and regulations that govern our business interests around the world, but will continue to set new standards of ethical conduct that will generate deep respect and inspire emulation by others.

N. Chandrasekaran

21st February, 2017



A. OUR VALUES

TATA has always been values-driven. The five core values that underpin the way we conduct our business activities are:



These universal values serve as the foundation for the Tata Code of Conduct. They find expression within the value system of every Tata company.

B. SCOPE AND PURPOSE OF THIS CODE

1. This Code sets out how we behave with:
 - our employees, or those who work with us;
 - our customers;
 - the communities and the environment in which we operate;
 - our value-chain partners, including suppliers and service providers, distributors, sales representatives, contractors, channel partners, consultants, intermediaries and agents;
 - our joint-venture partners or other business associates;
 - our financial stakeholders;
 - the governments of the countries in which we operate; and
 - our group companies.
2. In this Code, “we or us” means our company, our executive directors, officers, employees and those who work with us, as the context may require.
3. The term “our group companies” in this Code typically means companies Tata Sons intends for this Code to apply to, and / or to whom Tata Sons has issued this Code.
4. This Code sets out our expectations of all those who work with us. We also expect those who deal with us to be aware that this Code underpins everything we do, and in order to work with us they need to act in a manner consistent with it.

REMEMBER...

It is our commitment to protect our reputation and our brand equity by adhering to the values and principles set out in this Code. By doing so, we strengthen our unique culture and identity.

OUR CORE PRINCIPLES



The Tata philosophy of management has always been, and is today more than ever, that corporate enterprises must be managed not merely in the interests of their owners, but equally in those of their employees, of the consumers of their products, of the local community and finally of the country as a whole.

J.R.D. Tata

Chairman, Tata Sons (1938 – 1991)

C. OUR CORE PRINCIPLES

1. We are committed to operating our businesses conforming to the highest moral and ethical standards. We do not tolerate bribery or corruption in any form. This commitment underpins everything that we do.
2. We are committed to good corporate citizenship. We treat social development activities which benefit the communities in which we operate as an integral part of our business plan.
3. We seek to contribute to the economic development of the communities of the countries and regions we operate in, while respecting their culture, norms and heritage. We seek to avoid any project or activity that is detrimental to the wider interests of the communities in which we operate.
4. We shall not compromise safety in the pursuit of commercial advantage. We shall strive to provide a safe, healthy and clean working environment for our employees and all those who work with us.
5. When representing our company, we shall act with professionalism, honesty and integrity, and conform to the highest moral and ethical standards. In the countries we operate in, we shall exhibit culturally appropriate behaviour. Our conduct shall be fair and transparent and be perceived as fair and transparent by third parties.
6. We shall respect the human rights and dignity of all our stakeholders.
7. We shall strive to balance the interests of our stakeholders, treating each of them fairly and avoiding unfair discrimination of any kind.
8. The statements that we make to our stakeholders shall be truthful and made in good faith.
9. We shall not engage in any restrictive or unfair trade practices.
10. We shall provide avenues for our stakeholders to raise concerns or queries in good faith, or report instances of actual or perceived violations of our Code.
11. We shall strive to create an environment free from fear of retribution to deal with concerns that are raised or cases reported in good faith. No one shall be punished or made to suffer for raising concerns or making disclosures in good faith or in the public interest.
12. We expect the leaders of our businesses to demonstrate their commitment to the ethical standards set out in this Code through their own behaviour and by establishing appropriate processes within their companies.
13. We shall comply with the laws of the countries in which we operate and any other laws which apply to us. With regard to those provisions of the Code that are explicitly dealt with under an applicable law or employment terms, the law and those terms shall take precedence. In the event that the standards prescribed under any applicable law are lower than that of the Code, we shall conduct ourselves as per the provisions of the Code.

REMEMBER...

“Good faith” means having a reasonable belief that the information you have provided is truthful. It does not mean having ‘all the evidence’ about the potential violation or case reported.

OUR EMPLOYEES



Once you got the best people, the people who shared our values and ideals, we left them free to act on their own. We do not fetter them. We encourage them and give them opportunities for leadership.

J.R.D. Tata

Chairman, Tata Sons (1938 – 1991)

D. OUR EMPLOYEES

Equal opportunity employer

1. We provide equal opportunities to all our employees and to all eligible applicants for employment in our company. We do not unfairly discriminate on any ground, including race, caste, religion, colour, ancestry, marital status, gender, sexual orientation, age, nationality, ethnic origin, disability or any other category protected by applicable law.
2. When recruiting, developing and promoting our employees, our decisions will be based solely on performance, merit, competence and potential.
3. We shall have fair, transparent and clear employee policies which promote diversity and equality, in accordance with applicable law and other provisions of this Code. These policies shall provide for clear terms of employment, training, development and performance management.

Q&A

A job requirement entails extensive travel. One of the candidates has excellent relevant experience and qualifications. However, this candidate is a single parent. As a result, I feel such a situation would significantly hinder this candidate's ability to cope with the job requirement. What should I do?

In accordance with the Code, the decision to recruit an employee should be based upon merit. We cannot make a presumption that the candidate would not be able to meet the travel requirements of the job. All eligible candidates should be provided with equal opportunity to demonstrate or justify that they can cope with the travel requirements of the job. Being a single parent cannot be a ground to be discriminated against at any stage of recruitment or ongoing employment in our company.

REMEMBER...

We do not tolerate harassment in any form and therefore we expect every employee to discourage such misdemeanours in the workplace.

Dignity and respect

4. Our leaders shall be responsible for creating a conducive work environment built on tolerance, understanding, mutual cooperation and respect for individual privacy.
5. Everyone in our work environment must be treated with dignity and respect. We do not tolerate any form of harassment, whether sexual, physical, verbal or psychological.
6. We have clear and fair disciplinary procedures, which necessarily include an employee's right to be heard.
7. We respect our employees' right to privacy. We have no concern with their conduct outside our work environment, unless such conduct impairs their work performance, creates conflicts of interest or adversely affects our reputation or business interests.

Human rights

8. We do not employ children at our workplaces.
9. We do not use forced labour in any form. We do not confiscate personal documents of our employees, or force them to make any payment to us or to anyone else in order to secure employment with us, or to work with us.

Bribery and corruption

10. Our employees and those representing us, including agents and intermediaries, shall not, directly or indirectly, offer or receive any illegal or improper payments or comparable benefits that are intended or perceived to obtain undue favours for the conduct of our business.

REMEMBER...

Violation by even a single employee of any law relating to anti-bribery, anti-corruption, anti-competition, data privacy, etc. could result in severe financial penalties and cause irreparable reputational damage to the company.

Gifts and hospitality

11. Business gifts and hospitality are sometimes used in the normal course of business activity. However, if offers of gifts or hospitality (including entertainment or travel) are frequent or of substantial value, they may create the perception of, or an actual conflict of interest or an 'illicit payment'. Therefore, gifts and hospitality given or received should be modest in value and appropriate, and in compliance with our company's gifts and hospitality policy.

Freedom of association

12. We recognise that employees may be interested in joining associations or involving themselves in civic or public affairs in their personal capacities, provided such activities do not create an actual or potential conflict with the interests of our company. Our employees must notify and seek prior approval for any such activity as per the 'Conflicts of Interest' clause of this Code and in accordance with applicable company policies and law.

REMEMBER...

As a general rule, we may accept gifts or hospitality from a business associate, only if such a gift:

- has modest value and does not create a perception (or an implied obligation) that the giver is entitled to preferential treatment of any kind;
- would not influence, or appear to influence, our ability to act in the best interest of our company;
- would not embarrass our company or the giver if disclosed publicly.

The following gifts are never appropriate and should never be given or accepted:

- gifts of cash or gold or other precious metals, gems or stones;
- gifts that are prohibited under applicable law;
- gifts in the nature of a bribe, payoff, kickback or facilitation payment*;
- gifts that are prohibited by the gift giver's or recipient's organisation; and
- gifts in the form of services or other non-cash benefits (e.g. a promise of employment).

(*'Facilitation' payment is a payment made to secure or speed up routine legal government actions, such as issuing permits or releasing goods held in customs.)

Working outside employment with us

13. Taking employment, accepting a position of responsibility or running a business outside employment with our company, in your own time, with or without remuneration, could interfere with your ability to work effectively at our company or create conflicts of interest. Any such activity must not be with any customer, supplier, distributor or competitor of our company. Our employees must notify and seek prior approval for any such activity as per the 'Conflicts of Interest' clause of this Code and in accordance with applicable company policies and law.

Integrity of information and assets

14. Our employees shall not make any wilful omissions or material misrepresentation that would compromise the integrity of our records, internal or external communications and reports, including the financial statements.
15. Our employees and directors shall seek proper authorisation prior to disclosing company or business-related information, and such disclosures shall be made in accordance with our company's media and communication policy. This includes disclosures through any forum or media, including through social media.
16. Our employees shall ensure the integrity of personal data or information provided by them to our company. We shall safeguard the privacy of all such data or information given to us in accordance with applicable company policies or law.
17. Our employees shall respect and protect all confidential information and intellectual property of our company.
18. Our employees shall safeguard the confidentiality of all third party intellectual property and data. Our employees shall not misuse such intellectual property and data that comes into their possession and shall not share it with anyone, except in accordance with applicable company policies or law.
19. Our employees shall promptly report the loss, theft or destruction of any confidential information or intellectual property and data of our company or that of any third party.

Q&A

I am an accountant in the finance department of my company. Due to my artistic skills, I received an offer to pen cartoons for a children's publication for which I would receive compensation. I plan to undertake this activity during week-ends. What should I do before accepting this offer?

Before accepting the offer, you should ascertain whether the company policies and rules require you to make a disclosure to your supervisor so that the company may determine whether your undertaking this activity adversely affects our company's interests. On confirmation from the company that it does not do so, you would be free to take up the activity. It is also your duty to bring to the attention of the company whenever there is any change in the situation you have disclosed.

20. Our employees shall use all company assets, tangible and intangible, including computer and communication equipment, for the purpose for which they are provided and in order to conduct our business. Such assets shall not be misused. We shall establish processes to minimise the risk of fraud, and misappropriation or misuse of our assets.
21. We shall comply with all applicable anti-money laundering, anti-fraud and anti-corruption laws and we shall establish processes to check for and prevent any breaches of such laws.

Insider trading

22. Our employees must not indulge in any form of insider trading nor assist others, including immediate family, friends or business associates, to derive any benefit from access to and possession of price sensitive information that is not in the public domain. Such information would include information about our company, our group companies, our clients and our suppliers.

Q&A

Our company has recently announced the launch of a new business initiative. In connection with this, your friend who is a journalist with a leading business newspaper has asked you to provide some information that he could cover in his forthcoming article. He has promised not to quote you, or reveal your identity. Should you be giving him this information?

No. You should not be sharing information of this nature with the media, even if it is assured that the source would remain anonymous. Only authorised personnel in the company are permitted to speak to the media and provide information of this nature.

Our company has a “Use of Social Media” policy that lays down the “dos and don’ts” for use of social media even if you may access such media on your own time. Why is there such a policy?

External communication is a serious matter. It must be carefully managed because information put out with reference to our company or its businesses needs to be clear, truthful and not violate any undertakings we have given to other parties. In each business there are managers nominated to authorise and make different types of statements to the outside world. These managers should be consulted about any request for information you may receive or information you think we should give out.

In using social media, in particular blogs or social networking sites, you should exercise great caution while talking about our company or the business we do. It may feel like you are chatting with friends or expressing a personal opinion but even while doing so you cannot share any confidential information of our company.

REMEMBER...

We must respect the property rights of others by never misusing their assets, intellectual property or trade secrets, including the copying or downloading of unauthorised software, trademarks, copyrighted material or logos. We should never make unauthorised copies of computer software programs or use unlicensed personal software on company computers.

Prohibited drugs and substances

23. Use of prohibited drugs and substances creates genuine safety and other risks at our workplaces. We do not tolerate prohibited drugs and substances from being possessed, consumed or distributed at our workplaces, or in the course of company duties.

Conflicts of interest

24. Our employees and executive directors shall always act in the interest of our company and ensure that any business or personal association *including close personal relationships* which they may have, does not create a conflict of interest with their roles and duties in our company or the operations of our company. Further, our employees and executive directors shall not engage in any business, relationship or activity, which might conflict with the interest of our company or our group companies.

25. Should any actual or potential conflicts of interest arise, the concerned person must immediately report such conflicts and seek approvals as required by applicable law and company policy. The competent authority shall revert to the employee within a reasonable time as defined in our company's policy, so as to enable the concerned employee to take necessary action as advised to resolve or avoid the conflict in an expeditious manner.
26. In the case of all employees other than executive directors, the Chief Executive Officer / Managing Director shall be the competent authority, who in turn shall report such cases to the Board of Directors on a quarterly basis. In case of the Chief Executive Officer / Managing Director and executive directors, the Board of Directors of our company shall be the competent authority.

Q&A

You are responsible for maintaining our company's customer database. One of your friends is starting a business venture and requests you to share a few particulars from this database for marketing purposes of his business. He assures you that he would keep the data as well as his source confidential. Should you do so?

No. You should respect the confidentiality of customer information and not share any part of the database with any person without due authorisation.

You have access to revenue numbers of different business units of our company. While having a conversation with you over evening drinks, your friend enquires about the financial performance of our company. You do not share detailed information with your friend, but share approximate revenue figures. Is this conduct of yours correct?

No, it is not. You are not permitted to share financial information of our company with others who do not need to know this information. Financial information should always be safeguarded and disclosed only on a need-to-know basis after obtaining requisite approvals. Sharing of any price sensitive information that is not generally available with the public could also lead to violation of applicable insider trading laws.

27. Notwithstanding such or any other instance of conflict of interest that exists due to historical reasons, adequate and full disclosure by interested employees shall be made to our company's management. At the time of appointment in our company, our employees and executive directors shall make full disclosure to the competent authority, of any interest leading to an

actual or potential conflict that such persons or their immediate family (including parents, siblings, spouse, partner, children) or persons with whom they enjoy close personal relationships, may have in a family business or a company or firm that is a competitor, supplier, customer or distributor of, or has other business dealings with, our company.

REMEMBER...

A conflict of interest could be any known activity, transaction, relationship or service engaged in by an employee, his/her immediate family (including parents, siblings, spouse, partner, and children), relatives or a close personal relationship, which may cause concern (based upon an objective determination) that the employee could not or might not be able to fairly perform his/her duties to our company.

Examples of Potential Conflicts of Interest

A conflict of interest, actual or potential, arises where, directly or indirectly, an employee or executive director:

- (a) engages in a business, activity or relationship with anyone who is party to a transaction with our company;
- (b) is in a position to derive an improper benefit, personally or for any family member or for any person in a close personal relationship, by making or influencing decisions relating to any transaction;
- (c) conducts business on behalf of our company or is in a position to influence a decision with regard to our company's business with a supplier or customer where a relative of, or a person in close personal relationship with, an employee or executive director is a principal officer or representative, resulting in a personal benefit or a benefit to the relative;
- (d) is in a position to influence decisions with regard to award of benefits such as increase in salary or other remuneration, posting, promotion or recruitment of a relative or a person in close personal relationship employed in our company or any of our group companies;
- (e) undertakes an activity by which the interest of our company or our group companies can be compromised or defeated; or
- (f) does anything by which an independent judgement of our company's or our group companies' best interest cannot be exercised.

28. If there is a failure to make the required disclosure and our management becomes aware of an instance of conflict of interest that ought to have been disclosed by an employee or executive director, our management shall take a serious view of the

matter and consider suitable disciplinary action as per the terms of employment. In all such matters, we shall follow clear and fair disciplinary procedures, respecting the employee's right to be heard.

Examples of activities normally approved (post-disclosure) as per applicable company policy

Acceptance of a position of responsibility (whether for remuneration or otherwise) in the following cases would typically be permitted, provided the time commitments these demand do not disturb or distract from the employee's primary duties and responsibilities in our company, and are promptly disclosed to the relevant competent authority:

- (a) Directorships on the Boards of any of our group companies, joint ventures or associate companies.
- (b) Memberships/positions of responsibility in educational/professional bodies, where such association will promote the interests of our company.
- (c) Memberships or participation in government committees/bodies or organisations.

Q&A

You are in a relationship with a colleague who has been recently moved into your team and would now be reporting to you. What should you do?

Romantic or close personal relationships with another employee where a reporting relationship exists and one is responsible for evaluating the other's performance, is likely to create a conflict of interest. In such a situation, you would need to report the potential conflict to your supervisor.

Your company is submitting a proposal to a company in which you were previously employed. You have confidential information pertaining to your previous employer, which you believe will help your present employer in winning the contract. Should you share this information?

No. You should not share this information with your company since it relates to confidential information of a third party. Your company respects its employees' duty to protect confidential information that they may have relating to their previous employers.

You are the purchasing manager in the procurement department of your company. You receive an invitation from a supplier to attend a premier sporting event as her guest. This particular supplier is one of the vendors who has submitted a proposal for an open tender issued by your company. Should you accept the invitation?

No. You should not accept the invitation in this instance. Since you are in a key decision-making role for the tender, any unusual benefit that you receive could be perceived as an inducement that could compromise your objectivity.

OUR CUSTOMERS



We have continued to enjoy prosperity, even with adverse times to fight against. Our relations with all concerned are the most friendly. We have maintained the same character for straight-forward dealing with our constituents and customers. Our productions have continued to be of the same high quality, and therefore command the best reputation and realise the highest prices. ... I mention these facts only to point out that with honest and straight-forward business principles, close and careful attention to details, and the ability to take advantage of favourable opportunities and circumstances, there is a scope for success.

Jamsetji Tata

Founder of the Tata group
Chairman, Tata Sons (1868 – 1904)

E. OUR CUSTOMERS

Products and services

1. We are committed to supplying products and services of world-class quality that meet all applicable standards.
2. The products and services we offer shall comply with applicable laws, including product packaging, labelling and after-sales service obligations.
3. We shall market our products and services on their own merits and not make unfair or misleading statements about the products and services of our competitors.

Export controls and trade sanctions

4. We shall comply with all relevant export controls or trade sanctions in the course of our business.

Fair competition

5. We support the development and operation of competitive open markets and the liberalisation of trade and investment in each country and market in which we operate.
6. We shall not enter into any activity constituting anti-competitive behaviour such as abuse of market dominance, collusion, participation in cartels or inappropriate exchange of information with competitors.
7. We collect competitive information only in the normal course of business and obtain the same through legally permitted sources and means.

Dealings with customers

8. Our dealings with our customers shall be professional, fair and transparent.
9. We respect our customers' right to privacy in relation to their personal data. We shall safeguard our customers' personal data, in accordance with applicable law.

Q&A

You are the Regional Sales Manager of our company. You have become a member of an “informal group”, on an instant messaging service, whose members are the regional sales heads of our company’s competitors. The administrator of the group has requested an in-person meeting to informally discuss market conditions and brainstorm on “pricing strategy” from an industry perspective. What should you do?

Any meeting with competitors, especially to discuss “pricing strategy”, could be an attempt to promote an anti-competitive practice or manipulate prices. You should respond by declining this invitation and exiting the “informal group”. You should also report this incident to your supervisor and your Legal department.

You are attending a customer meeting with a colleague, and your colleague makes an untruthful statement about the company’s services. What should you do?

You should assist your colleague in correcting the inaccuracy during the meeting if possible. If this is not possible, raise the issue with your colleague after the meeting to enable him/her or the company to correct any misrepresentation made to the customer.

While working on a customer project, you receive a call from your colleague. He used to manage that customer account before you took over his role. He recalls that he had worked with the customer on developing a new ordering system which he thinks would be beneficial for another customer and requests you to send him the project details. What should you do?

You must not share this information without specific approval of the customer; you are not permitted to use a customer’s assets, including software, for another customer or for any personal use.

REMEMBER...

Striving for excellence in the standards of our work and in the quality of our goods and services is a core Tata value. It is the unwavering practice of this value that builds and sustains customer trust in our brand.

OUR COMMUNITIES AND THE ENVIRONMENT



In a free enterprise, the community is not just another shareholder in business but is in fact the very purpose of its existence.

Jamsetji Tata

Founder of the Tata group
Chairman, Tata Sons (1868 – 1904)

F. OUR COMMUNITIES AND THE ENVIRONMENT

Communities

1. We are committed to good corporate citizenship, and shall actively assist in the improvement of the quality of life of the people in the communities in which we operate.
2. We engage with the community and other stakeholders to minimise any adverse impact that our business operations may have on the local community and the environment.
3. We encourage our workforce to volunteer on projects that benefit the communities in which we operate, provided the principles of this Code, where applicable, and in particular the 'Conflicts of Interest' clause are followed.

The environment

4. In the production and sale of our products and services, we strive for environmental sustainability and comply with all applicable laws and regulations.
5. We seek to prevent the wasteful use of natural resources and are committed to improving the environment, particularly with regard to the emission of greenhouse gases, consumption of water and energy, and the management of waste and hazardous materials. We shall endeavour to offset the effect of climate change in our activities.

OUR VALUE-CHAIN PARTNERS



If we had done some of the things that some other groups have done, we would have been twice as big as we are today. But we didn't, and I would not have it any other way.

J.R.D. Tata

Chairman, Tata Sons (1938 – 1991)

(on the pace of expansion of the Tata group in the 1960s and 70s)

G. OUR VALUE-CHAIN PARTNERS

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 authorised 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.

Q&A

You head the procurement function in our company. You have tight budgetary constraints for a project that you are working on. In order to complete the project within the targeted costs, you intend to request your supplier to provide you an exceptional discount on this project order on the understanding that you would “make it up to him” in future orders. Would you be violating the Code?

Yes, you would. Inducement in any form, including future benefits to the supplier, could compromise your ability to act objectively and in the best interests of the company and therefore must be avoided.

REMEMBER...

Our value-chain partners would include our suppliers and service providers, distributors, sales representatives, contractors, channel partners, consultants, intermediaries and agents; joint-venture partners and other business associates.

OUR FINANCIAL STAKEHOLDERS



Ethical behaviour in business – in every sphere and with all constituents – has been the bedrock on which the Tata group has built, and operates, its enterprises. This has been an article of faith for the group ever since its inception, a fundamental element of our cherished heritage and the essence of our way of life.

Ratan Tata

Chairman, Tata Sons (1991 – 2012)

H. OUR FINANCIAL STAKEHOLDERS

1. We are committed to enhancing shareholder value and complying with laws and regulations that govern shareholder rights.
 2. We shall inform our financial stakeholders about relevant aspects of our business in a fair, accurate and timely manner and shall disclose such information in accordance with applicable law and agreements.
 3. We shall keep accurate records of our activities and shall adhere to disclosure standards in accordance with applicable law and industry standards.
-

GOVERNMENTS



Business, as I have seen it, places one great demand on you; it needs you to impose a framework of ethics, values, fairness and objectivity on yourself at all times. It is not easy to do this; you cannot impose it on yourself forcibly because it has to become an integral part of you.

Ratan Tata

Chairman, Tata Sons (1991 – 2012)

I. GOVERNMENTS

Political non-alignment

1. We shall act in accordance with the constitution and governance systems of the countries in which we operate. We do not seek to influence the outcome of public elections, nor to undermine or alter any system of government. We do not support any specific political party or candidate for political office. Our conduct must preclude any activity that could be interpreted as mutual dependence/favour with any political body or person, and we do not offer or give any company funds or property or other resources as donations to any specific political party, candidate or campaign.

Any financial contributions considered by our Board of Directors in order to strengthen democratic forces through a clean electoral process shall be extended only through the Progressive Electoral Trust in India, or by a similar transparent, duly-authorised, non-discriminatory and non-discretionary vehicle outside India.

Government engagement

2. We engage with the government and regulators in a constructive manner in order to promote good governance. We conduct our interactions with them in a manner consistent with our Code.
3. We do not impede, obstruct or improperly influence the conclusions of, or affect the integrity or availability of data or documents for any government review or investigation.

OUR GROUP COMPANIES



I do not think anyone was on par with Jamsetji as an industrial visionary. But that is not the sole reason why I have been an admirer of Jamsetji. The major reason was his sense of values, sterling values, which he imparted to this group. If someone were to ask me, what holds the Tata companies together, more than anything else, I would say it is our shared ideals and values which we have inherited from Jamsetji Tata.

J.R.D. Tata

Chairman, Tata Sons (1938 – 1991)

J. OUR GROUP COMPANIES

1. We seek to cooperate with our group companies, including joint ventures, by sharing knowledge, physical resources, human and management resources and adopting leading governance policies and practices in accordance with applicable law including adherence to competition law, where relevant.
2. We shall strive to achieve amicable resolution of any dispute between us and any of our group companies, through an appropriate dispute resolution mechanism so that it does not adversely affect our business interests and stakeholder value.
3. We shall have processes in place to ensure that no third party or joint venture uses the TATA name/brand to further its interests without proper authorisation.
4. Our Board of Directors shall consider for adoption policies and guidelines periodically formulated by Tata Sons and circulated to group companies.

Q&A

You are in the process of selecting potential vendors for an IT project in our company. In the final shortlist of two companies, one is a new start-up with limited references and a lower price-quotation, while the other is a Tata company with thirty years of implementation experience and good references, but a marginally higher quote for the same job. With all other parameters of choice being nearly equal, which company should you select for the job?

While price is undoubtedly an important criterion for decision making, it is clearly not the only one to be evaluated. You may also need to consider good customer references, proven track record and shared value systems in order to decide on your IT partner.

You are in the process of selecting potential vendors for a project. One of the three finalists is a group company. In reviewing the final proposals, you rank the group company second out of the three proposals based on pricing and total cost of ownership, and select the first-ranked vendor. Is this the right decision?

Yes. You should select the vendor that, on its own merits, is the vendor that is most appropriate for your company's requirements. You should not select a group company only because of its affiliation.

RAISING CONCERNS

We encourage our employees, customers, suppliers and other stakeholders to raise concerns or make disclosures when they become aware of any actual or potential violation of our Code, policies or law. We also encourage reporting of any event (actual or potential) of misconduct that is not reflective of our values and principles.

Avenues available for raising concerns or queries or reporting cases could include:

- immediate line manager or the Human Resources department of our company
- designated ethics officials of our company
- the 'confidential reporting' third party ethics helpline (if available)
- any other reporting channel set out in our company's 'Whistleblower' policy.

We do not tolerate any form of retaliation against anyone reporting legitimate concerns. Anyone involved in targeting such a person will be subject to disciplinary action.

If you suspect that you or someone you know has been subjected to retaliation for raising a concern or for reporting a case, we encourage you to promptly contact your line manager, the company's Ethics Counsellor, the Human Resources department, the MD/CEO or the office of the group's Chief Ethics Officer.

Q&A

My supervisor has asked me to do something which I believe may be illegal. I am afraid if I do not do what I am told, I could lose my job. Should I do it?

No. Breaking the law is never an option. Discuss the situation with your supervisor to be certain that you both understand the facts. If your concerns are not resolved, contact a higher level supervisor, the Ethics Counsellor, the Legal department or report them via the company's confidential reporting system, if available.

I feel that my supervisor is treating me unfairly for reporting a concern to the Ethics Counsellor. What should I do?

Retaliation against anyone who raises a concern is a violation of the Code. You should therefore promptly report this action of your supervisor to the Ethics Counsellor or the MD/CEO of your company or via the company's confidential reporting system, if available.

ACCOUNTABILITY

This Code is more than a set of prescriptive guidelines issued solely for the purpose of formal compliance. It represents our collective commitment to our value system and to our core principles.

Every person employed by us, directly or indirectly, should expect to be held accountable for his/her behaviour. Should such behaviour violate this Code,

they may be subject to action according to their employment terms and relevant company policies.

When followed in letter and in spirit, this Code is *'lived'* by our employees as well as those who work with us. It represents our shared responsibility to all our stakeholders, and our mutual commitment to each other.

SPEAK UP...

If you are unsure whether a particular action you are about to take is consistent with the principles set forth in the Code, ask yourself:

- Could it directly or indirectly endanger someone or cause them injury?
- Is it illegal/unlawful or out of line with our policies and procedures?
- Does my conscience reject it? Does it conflict with my personal values?
- Would I feel uncomfortable if the story appeared in the media? Would it shame my company, spouse, partner, parent or child?
- Does it 'feel' wrong?

If the answer to any of these questions is "Yes", please stop and consult your reporting manager, the Ethics Counsellor, the Human Resource department, the Legal department or any member of the senior management team, to assist you in making the decision.

When faced with a dilemma: Stop, Think, Act Responsibly

NOTE

The Code does not provide a comprehensive and complete explanation of all expectations from a company standpoint or obligations from a stakeholder standpoint.

Our employees have a continuing obligation to familiarise themselves with all applicable law, group-level advisories and policies, company-level policies, procedures and work rules as relevant. For any guidance on interpretation of the Code, we may seek support from our company's Ethics Counsellor or from the group's Chief Ethics Officer, as appropriate.

All joint ventures are encouraged to adopt the Tata Code of Conduct (TCOC) or a code of conduct that incorporates all elements of the TCOC.

This version of the Tata Code of Conduct supersedes all earlier versions and associated documents and stands effective from 29th July, 2015.

For any query or clarification on the Code, please contact the office of the group's Chief Ethics Officer via email at: ethicsoffice@tata.com.



TATA CODE OF CONDUCT – 2015

I acknowledge that I have received the Tata Code of Conduct.

I have read the Tata Code of Conduct and I acknowledge that as a Tata employee, I am required to comply with the guidelines described therein and failure to do so may subject me to action as per my employment terms and relevant company policies.

If I have a concern about a violation, or a potential violation of the Tata Code of Conduct, I understand that there are channels available to me in my company to report such concerns. By making use of these channels when necessary, I will play my part in maintaining the high ethical standards to which we hold ourselves.

Signature: _____

Date: _____

Name: _____

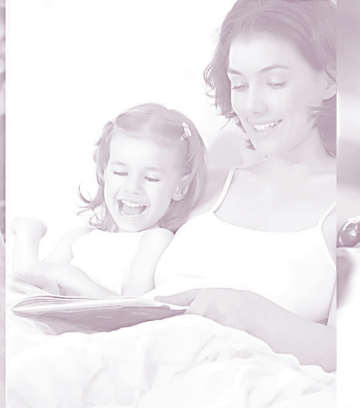
Department: _____

Address: _____

(Please submit this declaration to your Ethics Counsellor or the Human Resource department of your company.)







For further information on the Code please contact:
 The Ethics Office,
 Tata Sons Ltd.,
 Bombay House,
 24, Homi Mody Street,
 Mumbai – 400001, India.
 Email: ethicsoffice@tata.com

CORPORATE ENVIRONMENT POLICY

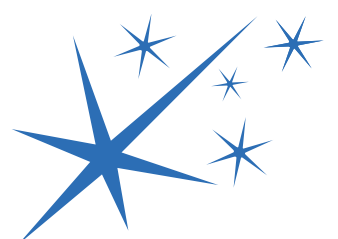
Tata Power is committed to a clean, safe and healthy environment, and we shall operate our facilities in an environmentally sensitive and responsible manner. Our commitment to environmental protection and stewardship will be achieved by:

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



(Praveer Sinha)
CEO & Managing Director

Date: 15th June, 2018



CORPORATE SUSTAINABILITY POLICY

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

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

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



(Praveer Sinha)
CEO & Managing Director

Date: 15th June, 2018

