| The Tata Power Company Ltd | TATA POWER | *OPEN TENDER NOTIFICATION* |
|---|---|---|
| *Tender Reference:* ***CC25VJS008*** | | *Document Date:* ***27th Apr 2024*** |

**The Tata Power Company Limited Invites Tender** through E-Tender Two-Part Bidding Process from interested bidders for the following package: -

**A. Summary of the tendered package:**

| Sr. No. | Description | Tender Reference no. | Bid Guarantee Fee / EMD (Rs.) | Tender Fee (Rs.) | Last Date and Time for payment of Tender Participation fee |
|---|---|---|---|---|---|
| For the following package please send mail to Mr Vinayak Shinde ( vinayak.shinde@tatapower.com) with copy to Mr. Rameshkumar P N (pnramesh@tatapower.com). | | | | | |
| 1. | Supply of 20 MVA 33/11 kV Ester filled Transformer with NIFPS for Mounte South DSS | CC25VJS008 | 2,00,000/- | 2,000 /- | 6th May 2024 |

**B. Procedure to Participate in Tender.**

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

1. Non-Refundable Tender Fee, as indicated in table above, to be submitted in the form of

Direct deposit in the following bank account and submit the receipt along with a covering letter clearly indicating the Tender Reference number –

Beneficiary Name – The Tata Power Co. Ltd.

Bank Name – HDFC Bank Ltd.

Branch Name – Fort Branch, Mumbai

Address – Maneckji Wadia Building, Nanik Motwani Marg, Fort, Mumbai 400023.

Branch Code – 60

Bank & Branch Code – 400240015

Account No – 00600110000763

Account type – CC

IFSC Code – HDFC0000060

2. Eligible and Interested Bidders to submit duly signed and stamped letter on Bidder's letterhead indicating

Tender Enquiry number

Name of authorized person

Contact number

e-mail id

Details of submission of Tender Participation Fee

E-mail with necessary attachment of 1 and 2 above to be send to vinayak.shinde@tatapower.com with copy to pnramesh@tatapower.com before "Last date and time for Payment of Tender Participation Fee"

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

Please note all future correspondence regarding the tender, bid submission, bid submission date extension, Pre-bid query etc. will happen only through Tata Power 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.

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

Any payment of Tender Participation Fee by Bidder who have not done the pre-requisite will not be refunded.

Also all future corrigendum's to the said tender will be informed on Tender section on website https://www.tatapower.com only.

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# OPEN TENDER NOTIFICATION

# FOR

# Supply of 20 MVA 33/11 kV Ester filled Transformer with NIFPS for Mounte South DSS

**The Tata Power Company Limited (Tata Power)**
**Smart Center of Procurement Excellence,2nd Floor,**
**Sahar Receiving Station, Near Hotel Leela,**
**Sahar Airport Road, Andheri East, Mumbai-400059**

## Section A : Tender Notice including Instruction to Bidders

### 1. Tender Details

### 1.1 Key Tender Specific Details

| | |
|---|---|
| **Reference Number** | **CC25VJS008** |
| **Description** | Supply of 20 MVA 33/11 kV Ester filled Transformer with NIFPS for Mounte South DSS |
| **Type of Tender** | **Firm Order** |
| **Estimated Period** | - |
| **Tender Fee** | **Rs 2000/-** |
| **Earnest Money Deposit (EMD)** | **Rs 2,00,000/-**<br>**Rs. Two Lakhs Only** |
| **Price Basis** | **Firm Price** |
| **Executive Handling this Tender*** | Name: Mr. Vinayak Shinde<br>E-Mail ID: vinayak.shinde@tatapower.com |
| **Technical Query *** | Name: Mr. A V Potdar<br>E-Mail ID: avpotdar@tatapower.com |

*You may contact the above personnel from Monday to Friday during office hours only.

**1.2 Calendar of Events**

| | | |
|---|---|---|
| (a) | Payment of Tender Fee and Submission of letter nominating authorized person by Interested Bidder indicating their intent to Buy Tender | Till 6th May 2024 |
| (b) | Access to Tender Documents through E-Tender system to authorized person of Interested Bidder | 6th May 2024 |
| (c) | Last Date of receipt of pre-bid queries, if any. | 10th May 2024, 1500 Hrs. |
| (d) | Last Date of Posting Consolidated replies to all the pre-bid queries as received | 14th May 2024 |
| (e) | Last date and time of receipt of Bids | 27th May 2024 |

**Note:- *** These date and time are as planned and tentative. In case of change the same shall be intimated to Authorized Person of Interested Bidder through E-Tender System.

Please note post submission of Bids relevant communication will be done with Authorized Person of Interested Bidder through E-Tender System

**1.3 Mandatory documents required along with the Bid**

1.3.1 Bid Guarantee Fee (EMD) of requisite value and validity. PLEASE NOTE THAT BID GUARANTEE ONLY IN FORM OF BANK GUARANTEE WILL BE ACCEPTED.

1.3.2 Requisite Documents to ascertain fulfilling of Technical and Commercial Pre-Qualification Requirement as detailed in Tender Enquiry.

1.3.3 Technical Submission including Drawings, Type Test details etc as detailed in Technical Specification.

1.3.4 Required Commercial Submission as detailed in Tender Document

1.3.5 Technical and Commercial Clarification and Deviations as per the format attached in the Tender Enquiry

1.3.6 Proper authorization letter to sign the tender and participate in Tata Power E-Tender system on the behalf of bidder.

1.3.7 **For vendor not registered with Tata Power, Duly filled Vendor Registration form with all supporting documents is mandatory to participate in the Tender**.

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

***Also please note that whenever editable format are shared it is requested that data be filled in relevant cells. No formatting or addition / deletion of rows / columns to be done. Wherever editable Excel submission are requested the file should be free from references, macros etc.***

**Checklist of Document Submission**

| Stage of Tendering | Document | Type of Format | Mode of submission |
|---|---|---|---|
| Before last date of Pre-Bid Query | Query / Clarification / Deviation (QCD) Format. (F1) Technical and Commercial | Editable Excel Format | Through message in E-tender system |
| | | | |
| **Bid Submission Envelope 1 (First Part)** | **Earnest Money Deposit** | **Original Bank Guarantee** | **In Sealed Envelope** |
| | | | |
| **Bid Submission Envelope 2 (Second Part)** | **Documents to be uploaded in Ariba only.** In case of multiple files, a zipped folder can be attached for the same (size limit of 100MB per zipped file) | | |
| To be submitted Under Tab 2.1 in Ariba | Duly filled PQR and supporting documents | | |
| | Duly filled PQR format | Editable Excel Format | E-Tender System |
| | Backup documents for Technical and Commercial PQR | Signed and Scanned documents | E-Tender System |
| To be submitted under Tab 2.2 in Ariba | Technical Submission and Supporting Documents | | |
| | Duly filled Unpriced Bid Format. Signed copy of Technical Specifications indicating your acceptance of the same | Signed and scanned copy of document | E-Tender System |
| To be submitted under Tab 2.3 in Ariba | Commercial Submission and supporting document | | |

| | | | |
|---|---|---|---|
| | Letter of Undertaking (FOR VENDORS NOT REGISTERED WITH TATA POWER) | Scanned Copy of letter of undertaking duly filled, stamped and signed | E-Tender System |
| | E-auction Undertaking form | Scanned Copy of letter of undertaking duly filled, stamped and signed | E-Tender System |
| | | | |
| Bid Submission Envelope 3 (Third Part) | **Duly filled Priced Bid Format** | Hard copy in original duly signed and stamped | **Sealed Envelope** |
| | Duly filled Priced Bid Format | To be entered in E-Tender System | E-Tender System |

**1.4 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 Query / Clarification / Deviation (QCD) Format. Deviations have to be mandatorily submitted in editable Excel sheet.

Technical or Commercial Deviation should be mentioned in Deviation Format only. Deviation in any other document or Format will not be considered.

**1.5 Right of Acceptance/Rejection**

1.5.1 Bids are liable for rejection in absence of following:-
1.5.2 Mandatory Documents as listed in 1.3 above
1.5.3 Price Bid as per the Price Schedule mentioned in Tender Document
1.5.4 Receipt of Bid and Response to queries within the due date and time
Tata Power reserves the right to accept/reject any or all the bids without assigning any reason thereof.

### 1.6 Qualification Criteria

| S.No. | Description | Qualifying Criteria | Evaluation Documents Required |
|---|---|---|---|
| 1 | Infrastructure | Bidder must be an OEM of Equipment with manufacturing facility / assembly in India.<br>The bidder must have in-house routine and acceptance testing facilities for acceptance as per relevant IS/IEC | Self-undertaking to be submitted in this regard.<br><br>TATA Power reserves the right to inspect the said manufacturing facility as a proof of compliance to this parameter. |
| 2 | Supply and Experience | The bidder must have supplied for same or higher size and voltage a minimum of 3 nos during last 3 years.<br><br>Indian Subsidiaries of global companies having plant in India are also eligible to bid if the qualification requirements stated above are met independently or in combination with the parent company. Declaration from parent company needs to be submitted. | Purchase Order Copies and Completion Certificates.<br><br>Self-undertaking to be submitted in this regard. TATA Power reserves the right to inspect the said manufacturing facility as a proof of compliance to this parameter. |
| 3 | Performance | The bidder should have performance certificates for 2 year satisfactory performance from at least 2 reputed Distribution Utilities for equipments of similar or higher rating. The work against these issued certificates should be completed in last seven years from the date of bid submission. In case the bidder has a previous association with any of Tata Power Groups for similar products and services, the performance feedback for that bidder by Tata Power User Group shall only be considered irrespective of performance certificates issued by any third organization. | Supply List & Performance Certificates from the utilities |
| 4 | Commercial Capability | Average Annual turnover of the bidder for last three years shall not be less than Rs 70 Crs | Copy of audited Balance Sheet and P&L Account along with UDIN number to be submitted in this regard. |
| 5 | Type Test | The bidder shall submit Type test reports obtained from CPRI/ERDA/ International Accredited Lab for the equipment / material offered. The type tests should have been | Type Test Report. |

| S.No. | Description | Qualifying Criteria | Evaluation Documents Required |
|---|---|---|---|
| | | conducted on the equipment / material of the same design.<br>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).<br>In case the type test reports furnished are not for the quoted equipment / material but for the equipment / material with higher voltage class and/or different capacity, then type test shall be carried out for the offered equipment / material from CPRI/ERDA / International Accredited Lab without any cost implication to the owner and the Type Test reports shall be submitted before dispatch of the equipment / material. | Undertaking that there is no change in design / material of construction (MOC) if Type Test Report older than 5 years.<br><br>Type test reports for the offered equipment / material from CPRI/ERDA/ International Accredited Lab without any cost implication to the owner and the Type Test reports shall be submitted along with BID. |

**1.7 Pre-Bid Queries**

Technical or Commercial Pre-Bid Queries if any has to be sent through message in E-Tender System. Pre-Bid Query has to be sent only in the Query / Clarification / Deviation (QCD) Format. Pre-Bid Queries sent in any other format or send through any other communication channel will not be accepted and answered. Pre-Bid Query have to be sent in the stipulated timeline as defined in the Tender Document. No Pre-Bid Query will be accepted after the due time and date as specified as "Last Date of receipt of pre-bid queries, if any"

**1.8 Marketing Integrity**

We have a fair and competitive marketplace. The rules for bidders are outlined in the General Condition of Contracts and other parts of Tender Documents. Bidders must agree to these rules prior to participating. In addition to other remedies available, Tata Power 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 or other part of the Tender Documents. 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

- Submit irrelevant documents or frequently cases of missing documents as part of compliance to Qualifying, Technical or Commercial Requirements causing unnecessary delay in Tender Evaluation

**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 Tata Power. This includes all bidding information submitted to Tata Power. All tender documents remain the property of Tata Power and all suppliers are required to return these documents to Tata Power upon request. Suppliers who do not honor these confidentiality provisions will be excluded from participating in future bidding events.

**1.10 Payment Terms**

100% payment shall be made within **60 days** ( 45 days for MSME) from the receipt and acceptance of the material at the Consignee Stores/Site/Location as per the Contractual Terms and Conditions.

## 2. Evaluation Criteria

- The bids will be evaluated technically on the compliance to tender terms and conditions.
- The bids will be evaluated commercially on the overall all-inclusive lowest cost for the complete tender BOQ / each line item as calculated in Schedule of Items. Tata Power however, reserves right to split the order line item wise and/or quantity wise among more than one Bidder. Hence all bidders are advised to quote their most competitive rates against each line item.
- Bidder has to mandatorily quote against each item of Schedule of Items. Failing to do so, Tata Power may reject the bids.

**NOTE:** In case of a new bidder not registered with Tata Power, factory inspection and evaluation shall be carried out to ascertain bidder's manufacturing capability and quality procedures. However Tata Power 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 Tata Power shall be final and binding on the bidder in this regard.

**2.1 Price Variation Clause and Cap: Firm Price**

## 3. Submission of Bid Documents

**3.1 Bid Submission**

Bidders are requested to submit their offer in line with this Tender document. Bids shall be submitted in 3 (three) parts:

**FIRST PART: "EMD – BANK GUARANTEE"** of Value detailed in 1.1 valid for 180 days from the due date of bid submission in the form of Bank Guarantee favoring 'The Tata Power Company Limited'. The EMD has to be strictly in the format as mentioned in Tender Document, failing which it shall not be accepted by Tata Power and the bid as submitted shall be liable for rejection.

Note : BG of 180 days and further claim period of 180 days is needed. In case the same cannot be issued by your bank then BG valid for 365 days can be provided.

Note : At times bidders have sought Tata Power bank details which is needed by them to make BG. Hence the same is reproduced below. These details are only provided to facilitate making of BG if needed:

Tata Power's Bank Details for submitting EMD BG:

Bank Name & Address – HDFC Bank, Maneckji Wadia Building, Nanik Motwani Marg, Fort, Mumbai 400 023.
A/c no. - 00600110000763
IFSC Code – HDFC0000060

The hard copy of EMD in a sealed envelope should be sent on address mentioned in Tender document.

**First Part has to be submitted in Sealed Envelope.**

**SECOND PART: "TECHNICAL / UN-PRICED COMMERCIAL BID"** shall contain the following documents:

a) Documentary evidence in support of Technical, Commercial qualifying criteria
b) Technical literature/GTP/Type test report/Details of Qualified Manpower Available/ Testing Facility available etc. *(complete in all respect as desired and detailed in Technical Specification and Technical Requirement Section)*
c) Duly filled Technical and Commercial Deviation Sheets
d) Duly filled formats like Authorization affidavit form
e) *Unpriced Commercial Bid*

**The technical / un-priced commercial bid shall be properly indexed and is to be submitted in Soft Copy though E-Tender system of Tata Power. Hard Copy of Technical Bids need not be submitted.**

**Second Part has to be submitted through E-Tender System Only**

**THIRD PART: "PRICE BID"** shall contain only the price details and strictly in Price Bid format along with explicit break up of basic prices and applicable GST. Basic price should include packaging forwarding, freight, transit insurance and any other cost envisaged by the bidder.

**Third part has to be submitted through E-Tender System (ARIBA) only.**

**FOR BIDS INVITED THROUGH E-TENDER SYSTEM (TECHNICAL AND UN-PRICED COMMERCIAL BID) :**

In response to advertisement Bidder has to provide details of person authorized to Bid on behalf of the Bidder. An e-mail will be generated by E-Tender System and the authorized person can download the Tender Documents from the system.
SECOND and THIRD PART of the Bid have to be submitted in E-Tender System.

**Bidders have to mandatorily submit SECOND PART (Technical and Un-priced commercial Bid) only through E-Tender system of Tata Power. Bids submitted through any other form/ route shall not be admissible.**

**EMD**
**"Please mention Tender Reference No"**

Please mention our Tender Reference No on the Tender and drop the same in our Tender Box located at The Tata Power Company Limited, Smart Center of Procurement Excellence,2nd Floor, Sahar Receiving Station, Near Hotel Leela, Sahar Airport Road, Andheri East, Mumbai-400059

Bids submitted by Email/Telex/Telegram /Fax will be rejected. No request from any Bidder to Tata Power to collect the proposals from Courier/Airlines/Cargo Agents etc. shall be entertained.

**SIGNING OF BID DOCUMENTS:**

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

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

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

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

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

**3.2 Contact Information**

**Communication Details: Detailed in 1.1**

**3.3 Bid Prices**

Bidders shall quote for the entire Scope of Supply/ work with a break up of prices for individual items and Taxes & duties. The bidder shall complete the appropriate Price Schedules included herein, stating the Unit Price for each item & total price with taxes, duties & freight up to destination at various sites of Tata Power. The all-inclusive prices offered shall be inclusive of all costs as well as Duties, Taxes and Levies paid or payable during the execution of the supply work, breakup of price constituents.

The quantity break up shown else-where other than Price Schedule is tentative. The bidder shall ascertain himself regarding material required for completeness of the entire work. Any items not indicated in the price schedule but which are required to complete the job as per the Technical Specifications/ Scope of Work/ 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. It also may be noted that the denomination of Purchase Order / Outline Agreement / Rate Contract and associated Payment to Successful Bidder shall also be in Indian Rupees Only. In case Bidder intends to import any equipment, part etc and supply to Tata Power then all liability and costs related to import will rest with the Bidder. All statutory compliances, payments, expenditure etc related to importing of equipment will be responsibility of the bidder.

**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, Tata Power may solicit the Bidder's consent to an extension of the Period of Bid Validity. The request and responses thereto shall be made in writing.

**3.6 Alternative Bids**

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

**3.7 Modifications and Withdrawal of Bids**

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

**3.8 Earnest Money Deposit (EMD)**

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

- Bank Guarantee valid for 180 days after due date of submission.

***The EMD shall be forfeited in case of:***

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

**Or**

b) In case of a successful bidder, if the Bidder, within 15 days, does not
i) accept the purchase order, or
ii) furnish the required Contract Performance Bank Guarantee (CPBG)

**Original Bank Guarantee submitted as EMD shall be returned only after completion of award process for unsuccessful bidders and issue of Contract Performance Bank Guarantee (CPBG) for successful bidder**.

## 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 Tata Powers processing of Bids or award decisions may result in the rejection of the Bidder's Bid.

**4.2 Technical Bid Opening**

Bids will be opened at Corporate Office of Tata Power as per our standard Process. The bids shall be opened internally by Tata Power. Technical bid must not contain any cost information whatsoever.

First the envelope marked "EMD" will be opened. Bids without EMD of required amount/ validity in prescribed format, shall be rejected.

Next, the technical bid of the bidders who have furnished the requisite EMD will be opened in E-Tender system.

**4.3 Preliminary Examination of Bids/Responsiveness**

Tata Power 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. Tata Power may ask for submission of original documents in order to verify the documents submitted in support of qualification criteria.

Prior to the detailed evaluation, Tata Power 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 Tata Power and/or the Tata Power 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, Tata Power may, at its discretion, ask the Bidder for a clarification on its Bid for any deviations with respect to the Tata Power 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 Tata Power.

**4.5 Price Bid Opening**

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 Tata Power without any further correspondence in this regard.

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.

**4.6 Reverse Auction and Price Matching Option**

Tata Power reserves the right to go for Reverse Auction (RA) for price negotiation and discover the most competitive price on ARIBA portal, Tata Power's official e-tendering platform. This will be decided after techno-commercial evaluation of the bids. Bidders need to give their acceptance with the offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case Tata Power decides to go for RA.

**Only those bidders who are techno-commercially qualified shall be eligible to participate further in RA process. However, the original H1 bidder (whose price bid is the highest post techno-commercial evaluation) shall not be allowed to participate in further RA process provided minimum three techno-commercially qualified bids are available.**

For case where more than one bidders have to be awarded (including Rate Contract / Outline Agreement) Price Matching Option will be exercised. Volume of job allocated to original competitive bidder will be more than bidder who is chosen through Price Matching Option. Tata Power decision regarding work sharing shall be final and no explanation OR clarification shall be given regarding the same.

## 5.0 Award Decision

Tata Power 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 Priced Bid Format subject to any corrections required in line with Clause 4.3 above. The decision to place purchase order/Outline Agreement/ Rate Contact solely depends on Tata Power on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that Tata Power may deem relevant.

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

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

### 5.1 Rate Contract / Outline Agreement

Rate Contract / Outline Agreement does not guarantee any assured business volume in Rupees or Quantity. Quantities are only indicative and specified for the purpose of readiness as per the request from Purchaser. Supplies shall be only against Firm Purchase Orders placed as per the agreed terms and conditions of Rate Contract / Outline Agreement. Purchaser shall be entitled at its discretion to place firm order for such supplies on "As and When Required Basis" without minimum take-off guarantee.
Rate Contract / Outline Agreement will have list of Items with Unit Rate and applicable Taxes and Duties. There will be a cap on value for which order which can be placed against the Rate Contract / Outline Agreement. Actual quantity ordered for each line item may differ significantly from the tentative quantity indicated in the Tender Document. One / few / all items of Rate Contract / Outline Agreement can be ordered till the Cap Value is reached.

## 6.0 Order of Preference/Contradiction:

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

1. Outline Agreement/Purchase Order (with Commercial conditions)
2. Special Terms and conditions (if applicable)
3. General Terms and conditions

4. Technical Specifications

In case there is a discrepancy in the BOQ mentioned in tender (to the extent modified through subsequent Corrigendum, if any) and the bid submitted by any bidder, the description as mentioned in the tender (to the extent modified through subsequent Corrigendum, if any) shall prevail.

## 7.0 Ethics

Tata Power is an ethical organization and as a policy Tata Power 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.

Tata Power work practices are governed by the Tata Code of Conduct. Bidder is request to refer Tata Code of Conduct Clause in General Terms and Conditions.

## 8.0 General Condition of Contract and Special Condition of Contracts

Any condition not mentioned above shall be applicable as per General Terms and Conditions and Special Condition of Contracts attached along with this tender.

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**Annexure 1**

**Schedule Of Items**

| Sr. no. | Material / Service Short Text (as per SAP) | Estimated Quantity | UoM | Unit Rate (Basic) | Total |
|---|---|---|---|---|---|
| 1 | TRANSFORMER,20MVA,33KV/11KV,KNAN ESTER, | 1 | EA | | |
| 2 | NIFPS system | 1 | EA | | |
| 3 | Mandatory Spares as per Specification | 1 | Set | | |
| 4 | Supervision charges for commissioning | 1 | AU | | |
| | **Total** | | | | |
| | GST | | | | |
| | **Total Value including GST** | | | | |
| **Total Amount with taxes in Words** | | | | | |

*(All Values to be entered in Indian Rs.)*

# TECHNICAL SPECIFICATION

## 20MVA,
## 33KV/11kV Power Transformer KNAN

| Rev No. | Prepared By & Date | Checked By & Date | Approved for Issue By & Date |
|---|---|---|---|
| R00 | Ketan Jadhav | Ajay V. Potdar | Ravindra M. Bhanage |
| | 05/02/24 | 05/02/24 | 05/02/24 |

## TECHNICAL SPECIFICATION COVER SHEET

**Document No: ENSE-DS-2034-R00**

**Document Title: Technical Specification of 20MVA, 33KV/11kV Power Transformer KNAN**

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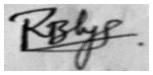
| R0 | **ENSE-DS-2034-R00** | 05/02/24 | | KJ |  | AVP |  | RMB |  |
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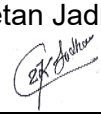
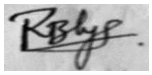
| R00 | Ketan Jadhav  | Ajay V. Potdar  | Ravindra M. Bhanage  |
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| R00 | Ketan Jadhav | Ajay V. Potdar | Ravindra M. Bhanage |
| | 05/02/24 | 05/02/24 | 05/02/24 |

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| 1 | **SCOPE** | This specification covers design, engineering, manufacture, shop testing, inspection, painting, packing, and supply of Power Transformers of following rating along with all accessories for efficient and trouble-free operation of the distribution network of Tata Power Company Ltd. at Mumbai.<br>33KV / 11kV, 20 MVA, Dyn11 Power Transformer with OLTC.<br><br>It is not the intent to specify completely herein all details of the equipment; nevertheless, the equipment shall be complete and operative in all respects and shall conform to the highest standard of engineering, design and workmanship of International Standards. |
| 2 | **APPLICABLE STANDARDS** | The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions and their latest amendment of the following Indian, International standards and shall conform to the regulations of the local authorities. |

| Sr. No. | Standards | Description |
|---|---|---|
| 1 | IS 5:2007 | Specification for Colors for Ready Mixed Paints and Enamels |
| 2 | IS 104:2017 | Specification for Reday Mixed Paint, Brushing, Zinc Chrome, Priming (Third Revision) |
| 3 | IS 649:1997 | Methods for testing steel sheets for magnetic circuits of power electrical apparatus |
| 4 | IS 1576:1992 | Solid Pressboard for Electrical Purposes -Specification |
| 5 | IS 2026:2011 | Specification for Power Transformers / IEC 60076 -2011 |
| 6 | IS 2099:1986 | Specification for Bushings for Alternating Voltages Above 1000 Volts |
| 7 | IS 2362:1993 | Determination of Water content in oil by Karl in oil Fischer Method- Test Method |
| 8 | IS 2544:1973 | Specification for Porcelain post insulators for systems with nominal voltage Greater than 1000V |
| 9 | IS 2705:1992 | Specification for Current Transformers |
| 10 | IS 3401:2023 | Specification of Silica Gel |
| 11 | IS 3637:1966 | Specification for gas operated relay (Buchholz relay). |
| 12 | IS 4253: Part II:2008 | Specification for cork composition sheets - Part II: Cork and Rubber. |
| 13 | IS 4257 (Part I):1981 | Dimensions for Clamping Arrangements for Porcelain Transformer Bushings - Part I: For 12 kV to 36 kV Bushings |
| 14 | IS 5082:1998 | Specification for Wrought Aluminum and Aluminum Alloy Bars, Rods,Tubes and, Plates and Sheets for Electrical purposes |
| 15 | IS 5561: 2018 | Specification for Electric Power Connectors. |
| 16 | IS 6103: 1971 | Specification for Testing of specific resistance (resistivity) of electrical insulating liquids |

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| | | 17 | IS 6262: 1971 | Method of test for power factor and dielectric constant of electrical insulating liquids |
| | | 18 | IS 6792: 2023 | Insulating Liquids - Determination Of The Breakdown Voltage At Power Frequency - Test Method |
| | | 19 | IS 8468: Part 1:2018 | Tap - Changers Part 1 Performance Requirements and Test Methods (First Revision) |
| | | 20 | IS 8603 (Part-1)2008 | Dimensions for Porcelain Transformer Bushings for Use in Heavily Polluted atmospheres - Part I: 12 kV, 24 kV 17.5 kV and 36 kV Bushings |
| | | 21 | IS 9335 | Specification for Cellulosic Papers for Electrical Purposes |
| | | 22 | IS 10028:1985 | Code of Practice for Selection, Installation and Maintenance of Transformers Part 1 |
| | | 23 | IS 12444:2020 | Copper Wire Rods for Electrical Applications Specification ( First Revision ) |
| | | 24 | IS 13964 :1994 | Methods of Measurement of Transformer and Reactor Sound level |
| | | 25 | IS 3639: 1966 | Specification for fitting & accessories of Power Transformers |
| | | 26 | IEC 60156: 1995 | Insulating liquids - Determination of the breakdown voltage at power frequency - Test method |
| | | 27 | IEC 60529: 2001 | Degrees of protection provided by enclosures (IP Code) |
| | | 28 | IEC 62770 | Specific Standard for unused natural ester liquids for Transformers and similar electrical equipment. |

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| 3 | **CLIMATIC CONDITIONS OF THE INSTALLATION** | 1 | Maximum ambient temperature | 43 deg.C |
| | | 2 | Max. Daily average ambient temp | 35 deg.C |
| | | 3 | Min Ambient Temperature | 07 deg.C |
| | | 4 | Maximum Relative Humidity | 100% |
| | | 5 | Minimum Relative Humidity | 40% |
| | | 6 | Average No. of thunderstorm per annum | 50 |
| | | 7 | Average Annual Rainfall | 2380mm |
| | | 8 | Average No. of rainy days per annum | 115 |
| | | 9 | Rainy months | June to Oct. |
| | | 10 | Altitude above MSL not exceeding | 300 meters |
| | | 11 | Average Air Pressure | 29.6-inch Hg |

Atmosphere is generally laden with mild acid and dust suspended during summer months and subjected to fog in winter months. The design of the equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1g.

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| 4 | **GENERAL TECHNICAL REQUIRMENTS** | **Sr. No.** | **Sr. No. Particulars** | **33kV /11.55kV** |
| | | 1 | Kind of Transformers | Ester Oil filled |

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|---|---|---|
| 2 | No of Phases | Three Phase |
| 3 | Rating (MVA) | 20 |
| 4 | Rated Frequency | 50 Hz |
| 5 | Cooling | KNAN |
| 6 | Type | Outdoor |
| 7 | Voltage ratio | 33KV / 11KV |
| 8 | Connection Delta/ Star | Delta / Star |
| 9 | Vector Group | Dyn11 |
| 10 | HV System Voltage (Nominal/Highest) | 33/36kV |
| 10.1 | Insulation Levels | 70kV RMS, 1min Dry power freq. |
| | | 170kV peak Impulse withstand (1.2/50 micro Sec) |
| 11 | LV System Voltage (Nominal/Highest) | 11/12kV |
| 11.1 | Insulation Levels | 28kV RMS, 1min Dry power freq. |
| | | 75kV peak Impulse withstand (1.2/50 micro Sec) |
| 12 | Standards applicable | IS 2026 |
| 13 | Impedance | 12% |
| 14 | HV tap changer | ON Load |
| 15 | Tapping (For on load & Off load) | -10% to + 10% |
| 15.1 | For off load in steps of 2.5% on HV side | Not Applicable |
| 15.2 | For on load in steps of 1.25% on HV side | 1.25% per step |
| 16 | Maximum temp. rise | |
| 16.1 | Winding | 55 Deg.C |
| 16.2 | Oil | 50 Deg.C |
| 17 | DC Control Voltage | 220V +/- 10 % |
| 18 | AC supply voltage | 415V, 3ph, 4 wire 50Hz |
| 19 | Direction of power flow | HV to LV |
| 20 | Phase arrangement | ABC as per IS 2026 |

21. Terminal arrangement:

HV Side:

Air filled cable box with clearance suitable for heat shrinkable cable terminations for terminating 33kV, 3 Core x 400 sq mm aluminium conductor, XLPE armoured cable complete with cable glands. The HT termination box should have height of 1.2Mtr from termination point to cable gland plate. Suitable louvers with water proofing shall be provided to take care of heat dissipation in cable termination box.

LV side:

Air filled cable box with clearance suitable for cable termination of terminating up to 6 nos. 11kV, 1 Core x 1000 sq mm aluminium conductor, XLPE armoured cable complete with cable glands. Suitable louvers with water proofing shall be provided to take care of heat dissipation in cable termination box.

The HV/LV cable boxes shall be made of Mild Steel (M.S.) Sheet. The HV/LV cable box front cover & bottom cable gland plate shall be removable for cable termination purpose. Inspection cover provision for HV/LV side cable box to be provided for maintenance activity. Suitable handle shall be provided on front cover of cable box with nut-bolt arrangement. Size of the cable cover should be moderate so that only 2 people is enough to lift it. Suitable canopy shall be provided over the connection of LV & HV Box to the Transformer Tank. Hygrostat with space heater shall be mounted in LV & HV cable box to arrest humidity & moisture.

Neutral:

One neutral shall be provided for purpose of grounding connection through 12kV outdoor type bushing on the tank of the transformer. A bushing CT of following ratio shall be provided for protection purpose:
1200 / 5A, Class 5P20, 30 VA
It shall be possible to remove the bushing CTs from the transformer tank, without removing the cover. CT pocket should have epoxy board with embedded CT terminals. The bushing CT shall have 2A test tap. Brass nuts along with lock-nuts, brass washers and spring washers shall be provided for all CT connections. The CT shall have polarity marking and terminals shall have well defined marking for usage, which shall be clearly written on CT terminal plates. CT specifications along with winding diagrams shall be provided in the transformer nameplate. The CT in the transformer to be of Pragati/ Huphen/ ECS Baroda/ Telk/ ABB/ CGL/ Siemens.

22. Phase arrangement:
    As per IS2026 and latest amendments (phase marking A B C left to right when viewed towards HV box). Phase marking to be painted on transformer assembly for both HV and LV side for easy reference.

23. Neutral Grounding
    Cooper flat of suitable rating shall be provided for grounding with suitable support insulator arrangement.

24. Core Bolt Grounding point shall be made available outside the tank through a separate bushing. (Ensuring single point earthing of core)

25. Flat Rollers
    The Transformer shall be provided with four bidirectional flat rollers with spacing 1726 (W) x 1756 (L) mm.

26. Fault levels
    The anticipated fault levels on the 33kV and 11kV sides are 25kA for 3 seconds.

27. Over fluxing capability - Transformers shall be designed for the continuous over fluxing withstand capability due to + 10% voltage variation on HV and frequency variation of + 5%.

28. Light / heater supply 240V, 1 Phase, 50 Hz AC systems

29. Remote temperature indicators

29.1 Remote winding and oil temperature indicators including the instruments to be mounted in the Purchaser's Control Room shall be provided.

29.2 For purpose of remote recording and data acquisition system, suitable detectors along with transducers of 4-20mA signal output shall be provided for top oil and HV winding temperature.

30. The transformer radiators should have separate isolating valves. Labels to be provided for all valves.

31. All the control cables on the transformer should be neatly tightened and provision of aluminium trays for lying of control cables to be ensured. All control cables should be properly tagged. All the control cables to be compressed with double compression cable glands. Vermin proofing to be ensure.

32. The danger boards to be provided on HT & LT boxes of the transformer.

33. Flexible Jumpers to be provided between HT Bushing & bus bars and LT Bushing & bus bars.

34. While designing the transformers manufacturers should maintain overall dimensions of Transformers as minimum as possible. Maximum allowable overall dimension should be 4.8 (W) mtr X 5.5 (L) mtr X 5.3 (H) mtr. Maximum allowable main tank dimension should be 2.3 (W) mtr X 5.0 (L) mtr X 4.0 (H) mtr.

35. Buchholz Relay - Suppliers shall preferably use Buchholz relay of reputed make. The same should be approved by Tata Power.

36. Marshalling Box

1) All the components located in the marshalling box shall have easy access for maintenance / replacement. Wiring shall be made with suitable size multithreaded cables and shall use round lugs. Access to the terminals on terminal block shall be easy to permit site modifications, if required. All the CT Links to be of disconnecting type. Nomenclature to be provided for terminals and peripherals.
2) All the CT Cables to be of 4 sq. mm with colour coded (RYB).
3) Flexible Earthing strips to be provided across all connecting bolts joining various metallic parts of transformer.
4) All control cable should be copper, FRLS insulation with armoured.
5) Wire terminals shall be hard core copper using round lugs.
6) CT shorting arrangement should be provided for WTI and neutral CT.
7) Suitable potential free initiating contact for all alarms shall be wired independently to the terminal blocks of marshalling box cabinet.

37. The canopies to be provided for all the LT; HT compartments; Buchholz, PRD, OSR & marshalling box.

38. Minimum clearance (In Air) between live parts shall be as follows:

| Location | 33kV (Bare Bushing) | 11kV (Bare Bushing) | Neutral (Bare bushing) |
|---|---|---|---|
| Phase to phase / Phase to Ground | 350 mm / 320 mm | 130 mm / 90 mm | 130 mm |

Creepage Distances for bushings shall be as follows:

| Location | 33 kV (Bare Bushing) | 11 kV (Bare Bushing) | Neutral (Bare bushing) |
|---|---|---|---|
| Total | 900 mm | 300 mm | 300 mm |

39. INSULATING OIL

1. All transformers shall be filled with new, unused, clean, standard ester oil in compliance with IEC 62770. The use of recycled oil is not acceptable.
2. Oil shall be filled under vacuum before filling it shall be filtered and tested.

40. PERFORMANCE

The transformer shall be capable of being operated, without danger, on any tapping at the rated MVA with voltage variation of +10 % to -10% corresponding to the voltage of the tapping. The transformer shall be designed with particular attention to the suppression of maximum harmonic voltage, especially the third and fifth so as to minimize interference with communication circuit. The transformer shall be able to withstand thermal and mechanical stresses caused by symmetrical or asymmetrical fault on any winding. The transformer and all its accessories including CTs etc. shall be designed to withstand the thermal and mechanical effects of any external short circuit to earth and of short circuits at the terminals of any winding for a period of 3 secs. Transformer shall be compatible for Operation along with Tap Changer Control and Transformer Monitoring Unit (TMU).

41. FREQUENCY

The transformer shall be suitable for continuous operation with a frequency variation of ±3% from normal of 50 Hz without exceeding the specified temperature rise.

42. PARALLEL OPERATION

The similar ratio & ratings transformers shall operate satisfactorily in parallel with each other connected between high voltage and low voltage conductor.

43. EARTHQUAKE

As the Transformers will be installed in areas prone to earthquakes, they shall be designed to withstand seismic forces equivalent to 0.1 g acceleration. Necessary devices for clamping the wheels to the rails shall also be provided along with any other suitable anti earthquake clamping arrangement.

44. The Guaranteed Technical Particulars shall be filled up completely by vendor.

45. OEM catalogues for Buchholz, WTI, OTI and PRD should be submitted by vendor.

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| | | 46. The Transformer to be compatible with NIFPS system.<br><br>47. WTI CT detail:<br><br>1 No. WTI CT should be provided on 1 phase of HV & 1 phase of LV side of transformer. The details of the same should be approved at the time of drawing approval by Tata Power. |
| 5 | GENERAL CONSTRUCTION | 5.0.1. All transformers shall be provided with detachable, flanged, bi-directional wheels for movement and mounting on rail gauge or flat type wheels. Bidder shall provide means for locking the wheels in positions parallel to and at right angles to the longitudinal axis of the tank.<br><br>5.0.2. Transformer shall be two winding type, with cold rolled grain oriented, silicon-steel laminations having excellent magnetic properties, insulated and clamped to minimize vibration and noise. Laminations shall be insulated from each other with material having high inter-lamination insulation resistance and rust inhibiting property. All covers and seals shall be oil and airtight and shall not be affected by ester oil action.<br><br>5.0.3. All fasteners of M10 and below size should be of stainless steel. All fasteners of M12 and above size should be hot dip galvanized. To achieve a good quality corrosion free painting, supplier should provide epoxy plus polyurethane paint with minimum total paint thickness of 180 microns.<br><br>5.0.4. The framework, clamping arrangement and general structure of the cores of each transformer shall be of robust construction and shall be capable of withstanding any shock to which they may be subjected during transport, installation and service. The framework and the core bolts shall be efficiently insulated from the core so as to reduce the eddy currents to a minimum.<br><br>5.0.5. The limbs and the yokes of the core shall have similar sections to minimize heating and noise arising from transverse flux. The joints in the laminated magnetic circuit shall be interleaved. Necessary cooling ducts shall be provided for heat dissipation from the core so that the anticipated maximum hot spot temperature in the core shall not be injurious to any material used in the core assembly.<br><br>5.0.6. The core clamping frame shall be provided with lifting eyes having ample strength to lift the complete core and winding assembly. The core assembly of oil immersed transformers shall be electrically connected to the transformer tank for effective core earthing.<br><br>5.0.7. The neutral terminal shall be brought out through neutral bushing from the tank and the same shall be brought up to the skid level, duly insulated by means of suitably rated epoxy insulators. The neutral conductor lead shall be of copper conductor designed to carry the maximum E/F current with solidly earthed neutral. The bidder shall justify the voltage/current rating of the neutral bushing chosen during detailed engineering. The voltage rating of the neutral bushing shall be chosen considering the probable voltage rise for neutral floating conditions. The current rating shall be chosen considering solidly earthed neutral. The neutral shall be formed at the bottom of the winding and brought to LV Neutral bushing thru a separate path.<br><br>5.0.8. The neutral CT shall be mounted in an enclosure (IP 55) outside the main transformer tank. Both primary and secondary terminals of the NCTs shall be accessible for testing. The NCTs shall be mounted in the Neutral to Earth path. |

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| | | 5.0.9. Top sampling valve shall be internally/externally piped and brought out of the tank sideways at skid level.<br><br>5.0.10. Transformer with all accessories shall be of free-standing type. Transformer accessories shall be designed in such a way that no supporting posts/structures are necessary other than the rail.<br><br>5.0.11. The sets of radiator banks shall be connected to the main tank through a header pipe welded to the tank. Design wherein individual radiator is connected to main tank is not acceptable. Individual radiator tubes shall be connected to main tank through butterfly valves at both ends of radiator tubes. Arrangement shall be made for suitable gap between main tank and radiator tubes.<br><br>5.0.12. The oil shall be supplied in non-returnable drums. The quantity shall be of 10% excess over the requirement of transformer at 30ºC.<br><br>5.0.13. Magnetic oil level indicator shall comprise with 2 nos. mercury contacts (for High / Low oil level alarm).<br><br>5.0.14. **Silica gel breather (With orange color Eco friendly indicating type Gel) with clear sight glass & oil sealing arrangement shall be used for Main tank conservator & OLTC purpose. The breather capacity shall be 15 KG or 8Kg+8Kg for main tank.**<br><br>5.0.15. The transformer shall be suitable for operation at full rated power on all tapings without exceeding the applicable temperature rise. The transformer shall be designed to suppress harmonic content, especially the third and fifth, to eliminate distortion in the waveform and consequent additional insulation stress, noise on communication system and undesirable circulating currents between the neutrals at different transformer stations.<br><br>5.0.16. The design of each transformer shall be such that the risk of accidental short-circuits due to birds or vermin are obviated. All outdoor apparatus and fittings shall be so designed that they do not collect water at any point.<br><br>5.0.17. All electrical connections and contacts shall be of ample cross sections for carrying the rated current without excessive heating.<br><br>5.0.18. Each transformer shall be designed for minimum no-load and load losses within the economic limit and as per the Indian Standards. **Maximum no load loss at rated voltage shall not exceed 10 KW & Maximum load loss at rated voltage shall not exceed 70 KW.** Bidder can offer loss values lower than as mentioned above without any cost implication to Tata Power.<br><br>5.0.19. Ground terminals shall also be provided on marshalling box, OLTC local control panel and cable end box to ensure effective earthing.<br><br>5.0.20. For continuity of earth connection, all gasketted joints shall be provided with minimum two numbers copper strip jumpers of adequate size.<br><br>5.0.21. Rain Guard shall provide for Buchhloz Relay, OSR, PRV and Marshalling Box so that rain- water does not enter to the junction box of these relays/ cubicles. Wiring shall be bottom entry. |

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| | | 5.0.22. At the time of erection and commissioning, authorized person of the bidder shall be present at the site till completion of the work.<br><br>5.0.23. A valve or suitable means to be provided to fix the online dissolved gas monitoring system to facilitate continuous DGA. |
| **5.1** | **CORE** | 5.1.1 The core shall be wound type of high grade cold rolled, non-ageing, grain oriented, annealed silicon steel lamination (CRGO), having low loss & good grain properties, coated with hot oil proof insulation, bolted together to the frames firmly to prevent vibration or noise. The grade of core shall be M3 or better. The core shall be stress relived by annealing under inert atmosphere if required, especially suitable for transformer. 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. The successful bidder is required to submit the following documents about the procurement of core material.<br><br>a) Invoice of supplier<br>b) Mill's test certificate<br>c) Packing list<br>d) Bill of landing<br>e) Bill of entry certificate by custom<br>f) Description of material, electrical analysis, physical inspection certificate for surface defects, thickness and width of the material<br>g) Subjecting to at least 10% of the transformer to routine tests and no load and load loss measurement<br>h) Purchaser shall impose heavy penalty or black list bidders using seconds/ defective CRGO sheets or load losses found to be more than stipulated limit.<br><br>5.1.2 After being sheared the laminations shall be treated to remove all burrs. Both sides of steel laminations shall be so constructed that eddy currents will be minimum.<br><br>5.1.3 The core frame shall be provided with lugs suitable for lifting the complete core and coil assembly of the transformer.<br><br>5.1.4 The core and the coil shall be so fixed in the tank that shifting will not occur when the transformer is moved or during a short circuit.<br><br>5.1.5 All steel sections used for supporting the core shall be thoroughly sand blasted after cutting, drilling and welding. Each core lamination shall be insulated with a material that will not deteriorate due to pressure and hot oil.<br><br>5.1.6 The supporting framework of the core shall be so designed as to avoid presence of pockets which would prevent complete emptying of tank through drain valve or cause trapping of air during oil filling. Adequate lifting lugs shall be provided to enable the core and windings to be lifted. |
| **5.2** | **Core Grounding** | The grounding lead from the core shall be brought out of the tank through 11kV class bushing and grounded externally. A protective cover shall be provided for the bushing. The core grounding rod (stem) through the bushing shall be solid rod (stem). The design of core grounding arrangement shall be such that the grounding links shall not come out of core during installation as well service |

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| | | conditions. The supplier shall submit a drawing clearly showing the details of core grounding. The core / frame grounding's both connections shall be brought out through a suitable bushing for provision of external grounding. The bidder shall submit the drawing clearly showing the details of core grounding. |
| 5.3 | WINDING CONNECTIONS | 5.3.1 The windings shall be so designed that all coil assemblies of identical voltage ratings shall be interchangeable and field repairs to the windings can be made readily, without special equipment. 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.<br><br>5.3.2 Coils should be transposed to minimize magnetic forces and extra supports shall provide for inter-disc connection.<br><br>5.3.3 All materials used in the insulation and assembly of the winding shall be new, insoluble, noncatalytic, and chemically inactive in the hot transformer oil, and shall not soften or otherwise be adversely affected under the operating conditions. The current density of coil shall not exceed 2.6 Amps/ sq mm at min tap at 20 MVA rating.<br><br>5.3.4 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.<br><br>5.3.5 The winding shall be brought out through bushing and provided with suitable terminal connectors, the details of which will be forwarded later.<br><br>5.3.6 The windings shall be clamped securely in place so that they will not be displaced or deformed during short circuits. The assembled core and windings shall be vacuum-dried and suitably impregnated before removal from the treating tank. The copper conductors used in the coil structure shall be best suited to the requirements, and all permanent current carrying joints in the windings and the leads shall be brazed.<br><br>5.3.7 Sharp bends should be avoided in the windings as far as possible, where unavoidable such bends should be reinforced with extra insulation tapes.<br><br>5.3.8 The tolerance for the winding resistance measurement for different phases but at same taps shall be limited to 1%.<br><br>5.3.9 The change in impedance values between the winding (HV/LV) shall not exceed ±10% of nominal impedance value as specified at all taps on HV/LV side.<br><br>5.3.10The windings shall be brought out through bushing. The windings shall be designed to withstand the specified thermal and dynamic short-circuit stresses. 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.<br><br>5.3.11 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.<br><br>5.3.12 The HV and LV windings conductor size details should be provided. |

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| | | 5.3.13. Primary and secondary windings shall be constructed from high- conductivity (copper conductors), Double Paper Covered (DPC) copper conductor.<br><br>5.3.14. The insulation between core and bolts and core and clamps shall withstand 2.5 kV for one minute.<br><br>5.3.15. Proper bonding of inter layer insulation with the conductor shall be ensured. Test for bonding strength shall be conducted as per standards.<br><br>5.3.16. 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.<br><br>5.3.17. 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 |
| **5.4** | **TRANSFORMER TANK AND TANK CONSTRUCTION** | 5.4.1 The transformer tank and cover shall be fabricated from good commercial grade low carbon steel suitable for welding and shall be of adequate thickness. The tank and the cover shall be of welded construction. All seams shall be welded and where practicable they shall be double welded. The tank shall have sufficient strength to withstand without permanent distortion filling by vacuum and (ii) continuous internal gas pressure of 0.35 atm with oil and operating level.<br><br>5.4.2 The tank material shall be as per IS: 2026 or equivalent with ultrasonic testing done for elimination of defects in rolled plates. The welding shall be as per prior approved WPS (Welding Procedure Specs) by trained and tested welders. 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. All fittings like elbows, bends etc. shall be seamless as per applicable American or Indian Standards. No resistance welding of fasteners shall be done anywhere on the transformer.<br><br>5.4.3 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. To ensure oil tightness, recessed neoprene or equivalent gaskets shall be used.<br><br>5.4.4 Manholes with welded flange and bolted covers shall be provided on the tank. The manhole shall be of sufficient size to afford easy access to the lower ends of all the bushings, terminals etc. to permit replacement of auxiliaries without removing tank covers.<br><br>5.4.5 Suitable guides shall be provided for positioning the various parts during assembly or dismantling. Adequate space shall be provided between the cores and windings and the bottom of the tank for collection of any sediment.<br><br>5.4.6 All joints including bolted as well as flanged, shall have machined matching surfaces/inner edges with smooth finish, to ensure leak proof joints.<br><br>5.4.7 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. |

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| | | 5.4.8 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.<br><br>5.4.9 The tank shall be provided with two nos. of suitable copper alloy lugs for grounding. 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.<br><br>5.4.10 Each tank shall be equipped with the following valves with standard flange connection for external piping:<br><br>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.<br><br>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.<br><br>c) One filter valve located slightly above the bottom of the tank.<br><br>d) One relief valve to operate at a pressure below the test pressure for the tank.<br><br>e) Other two nos. valves shall also be provided, as required for proper functioning of the transformer.<br><br>5.4.11 A suitable locking arrangement shall be provided for locking these valves in close/open position. 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.<br><br>5.4.12 For the auxiliary lead wiring from individual instrument to marshalling box, the cables shall be provided in the conduits.<br><br>5.4.13 All the transformers shall be provided with a ladder having 'anti-climbing' device. Ladder length should be of sufficient to safely climb on to the transformer.<br><br>5.4.14 Transformer tank shall be of welded sheet steel construction and provided with gaskets steel cover plates. Base shall be suitably reinforced to prevent any distortion during lifting. Base channels shall be provided with skids and pulling eyes to facilitate handling. All seams shall be electrically double welded for absolute oil tightness.<br><br>5.4.15 Suitable arrangement shall be made for working on transformer top, suitable safety guard shall be provided or arrangement to be made on the transformer.<br><br>5.4.16 Guards shall be provided for drain, bottom sampling and filter valves to prevent oil pilferage.<br><br>5.4.17 Minimum Thickness for the transformer shall be as follows:<br>Tank Side wall (mm) 10<br>Tank Top Cover (mm) 12<br>Tank Bottom Plate (mm) 12<br>Conservator (mm) 06 |

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| | | 5.4.18 Centre of gravity for Transformer body to be marked excluding radiator to have balanced lifting arrangement at site. Vibration measurement recorder during transport should be provided of the transformer.<br><br>5.4.19 Necessary additional valve to support NIFPS system to provided. |
| **5.5** | **OIL PRESERVING EQUIPMENT** | 5.5.1 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 eco-friendly silica gel breathers to facilitate replacement of breather without having to keep Buchholz relay inoperative. The breathers shall have clear transparent, UV stabilized/retardant Polycarbonate with min. 3 mm thickness.<br><br>5.5.2 Conservator oil preservation bag (atmoseal 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 this bag shall be clearly mentioned in the price schedule at the specified place. With this type conservator shall supply air or nitrogen filing arrangement with all accessories needed at the time of commissioning and pressure gauge arrangement shall be provided for monitoring pressure in the bag. Mode of operation of this bag also to be provided on separate name plate of Transformer for ready reference.<br><br>5.5.3 Prismatic oil level indicators with red Color float shall be provided on main tank and OLTC tank Conservator. Dual contacts are required for both MOGs (Main Tank & OLTC conservator).<br><br>5.5.4 Separate conservator tank shall be provided for OLTC. 70L tank shall be provided for 33kV class |
| **5.6** | **TAP CHANGING MECHANISM On Load Tap changer (OLTC)** | a) OLTC shall have all the feature to meet the requirement. The equipment shall conform to the latest applicable Indian standard / IEC standard.<br><br>b) 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 more than the safe current that the tap changer can handle. The OLTC gear shall withstand through fault currents without injury.<br><br>c) 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.<br><br>d) 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. An 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. |

e) 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.

f) Oil filled compartments shall be provided with filling plug, drain valve with plug, air release vent, oil sampling device, inspection opening with gasketed and bolted cover with lifting handles.

g) The OLTC motor shall be provided with 415 V auto changeover facilities. For the control of OLTC, tap change control relay (a-eberle/Pradeep make Fx4000D or other approved make of Tata Power) shall be provided by purchaser. Tap position indication along with the various alarms of tap changer shall be indicated in the marshalling box.

h) 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.

i) OLTC driving mechanism and its associated control equipment shall be mounted in an outdoor, weather proof cabinet, which shall include:

- Driving motor (415 V - 3 phase, 50 Hz, AC squirrel cage)
- Motor starting contactor with thermal overload relays, isolating switch and HRC fuses.
- Duplicate sources of power supply with automatic changeover from the running source to the standby source and vice versa.
- End Limit Switch shall be provided to prevent operation beyond extreme taps & Contacts shall be provided for operation through SCADA.
- Limit switch to cut off electrical operation on insertion of manual handle (Contacts shall be provided for operation through SCADA).
- Local/Remote selector switches shall be provided with status indication.
- Control switch: Raise/off/lower (spring return to normal type). (Contacts shall be provided for operation through SCADA).
- Remote/local selector switch (maintained contact type). (Contacts shall be provided for operation through SCADA).
- Mechanical tap position indicator showing rated tap voltage against each position and resettable maximum and minimum indicators.
- Limit switches to prevent motor over travel in either direction and 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.
- Gasketted and hinged door with locking arrangement. (Good quality gasket to be used by vendor)
- 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. OLTC Counter should be SCADA compactible for counting no of OLTC operation.
- 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 operation.
- OLTC shall be provided with Pressure Relieve Valve.
- 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.
- OLTC control box should be provided with heater.

j). Control Requirements for OLTC:

The following electrical control features shall be provided:

- Positive completion of load current transfer, once a tap change has been initiated, without stopping on any intermediate position, even in case of failure of external power supply.
- Only one tap change from each tap change impulse even if the control switches or push button is maintained in the operated position.
- Cut-off of electrical control when manual control is resorted to. It shall not be possible to operate the electric drive when the manual operating gear is in the use.
- Cut-off of a counter impulse for a reverse tap change until the mechanism comes to rest and resets the circuits for a fresh operation.
- Cut-off of electrical control when it tends to operate the tap beyond its extreme position. Mechanical limit switches shall be provided for this purpose to achieve suitable interlocking.
- 1 no small wall mounted RTCC panel (500 mm L x 500 mm W) having 1 Nos Tap change control relay shall be provided. Total 1 No. of RTCC panel should be provided per transformer. 10% additional links should be provided in RTCC panel. All links should be droppable type.

**k) AVR relay (Automatic Voltage Regulation relay):**

OLTC shall be able to do automatic / parallel operations through AVR relay

The AVR relay shall be with Plug in type input and output connection to disconnect it from the system within no time without disturbing the control panel.
The AVR relay shall have user friendly configuration.
User settable control settings for following parameters and outputs on front panel:

- Desired voltage settings.
- Bandwidth
- Pulse duration.
- Under Voltage.
- SCADA capability with Modbus software.

One pair of normally open relay contacts are provided for tap changer to effect 'LOWER' and 'RAISE' the voltage of power transformer.

| Sr. No. | Features | Tata Power Requirements |
|---|---|---|
| 1 | PT supply | 110V AC ±10% ,50Hz, 2.5VA |
| 2 | Auxiliary Supply | 75V–275V AC/DC, 50 Hz, 15VA |
| 3 | Basic Voltage Range/Adjustment (BVA) | BVA between 50V-140V AC |
| 4 | Sensitivity | Adjustable around BVA from 0.5% to 9.9% in step of 0.1% |
| 5 | Time delay setting | Voltage independent time delay, adjustable from 1sec to 999 secs |
| 6 | Under Voltage Blocking & Restoration | Blocking from under voltage set to 70%-90% of BVA setting & restoration at 85% of BVA |
| 7 | Display | LCD (16 x 2) |
| 8 | Operating Temp | -40ºC to 60ºC |
| 9 | Control Output | One pair of normally potential free open Contacts of rating 5A at 230V AC for 'RAISE', 'LOWER', functions. |
| 10 | Mounting | Flush |
| 11 | Dielectric Strength | 2kV AC for 1 minute for first time & further only 80% should be applied |
| 12 | RS 485 port | Optional |

l) 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.

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| | | m) Auxiliary Power Supply of OLTC and Power Circuit:<br><br>Two auxiliary power supplies, 3ph 4w 415 V, shall be provided by the purchaser for OLTC & power circuit. 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. Design features of the transfer switch shall include the following:<br><br>• Provision for the selection of one of the feeders as normal source and other as standby.<br>• Upon failure of the normal source, the load shall be automatically transferred after an adjustable time delay to standby sources.<br>• Indication to be provided at marshalling box for failure of normal source and for transfer to standby source and for failure to transfer.<br>• Automatic re-transfer to normal source without any intentional time delay following re-energization of the normal source.<br>• Both the transfer and the re-transfers shall be dead transfers and AC feeders shall not be paralleled at any time.<br><br>n) Manual Control:<br><br>The cranking device for manual operation of the OLTC gear shall be removable and suitable for Operation by a man standing at ground level.<br><br>The mechanism shall be complete with the following:<br><br>• Mechanical tap position indicator which shall be clearly visible from near the transformer.<br>• A mechanical operation counter.<br>• Mechanical stops to prevent over-cranking of the mechanism beyond the extreme tap positions.<br>• 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. |
| **5.7** | **INSULATING PAPER AND INSULATING PRESSBOARD** | 1. The bidder shall submit characteristics along with make for all the type of insulation papers and Pressboards used with the offer.<br>2. Inter layer insulation both for HV and LV windings shall be Epoxy diamond dotted Kraft paper and compressed pressboard.<br>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 25% of its width.<br>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.<br>5. Kraft paper and Pressboard should be of class A (105°C) insulation material.<br>6. All spacers, axial wedges / runners used in windings shall be made of pre-compressed solid pressboard.<br>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

| Characteristics | Kraft Paper | Pressboard (all Sizes) |
|---|---|---|
| 1. Dimension | As specified by bidder with +5% tolerance. | As specified by bidder with tolerance as per IS1576. |
| 2. Apparent Density | >0.80 g/cm3 | as per IS1576 w.r.t Thickness |
| 3. pH of Aqueous extract | 6-8% | 6-8% |
| 4. Electrical strength<br>i) in air<br>5. ii) In Oil | <br>7kV/mm<br>- | <br>12kV/mm<br>35kV/mm |
| 6. Ash content | Maximum 1% | Maximum 0.7% |
| 7. Moisture content | Maximum 8% | Maximum 8% |
| 8. 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

**5.8 BUSHINGS**

5.8.1 Bushings provided by the bidder shall be as per mentioned IS. 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.

5.8.2 All main winding leads shall be brought out through the bushings as specified which shall be so located that the full flashover strength will be utilized, and the adequate phase clearance shall be realized.

5.8.3 Each bushing shall be so co-coordinated with the transformer insulation that all flash-over will occur outside the tank.

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| | | 5.8.4 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 upto 170kV 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.<br><br>5.8.5 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.<br><br>5.8.6 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:<br><br>• Visual examination<br>• One-minute dry withstand test<br>• Oil tightness test |
| **5.9** | **RADIATORS** | The radiators of cooler units shall be epoxy painted. All the 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/galvanizing of radiators along with the bid. Price for galvanized radiators shall be quoted separately. The Color shade for the radiator shall be shade **RAL 6037** green.<br><br>The following accessories shall be provided for radiator<br><br>a) Shut off valves and blanking plates on transformer tank at each point of connection.<br>b) Top and bottom shut off valves and blanking plates on each radiator.<br>c) Lifting lugs<br>d) Top oil filling plug.<br>e) Air release plug at top.<br>f) Oil drain plug at bottom.<br>g) Top oil filling pump.<br><br>**All radiators shall be tested for**<br><br>a) Vacuum test for one hour<br>b) Hydraulic pressure test using transformer oil for one and half hour (as per ASME)<br>c) Air test can be done in place of hydraulic pressure test provided water tank will be made available for submerging the radiators into water for leak detection.<br>d) All the tests shall be done in black condition (i.e. before applying any paint).<br>e) 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.<br>f) 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.<br>g) 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 |

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| | | provided for each connection for use when the cooler unit is detached. Each cooler unit shall have a lifting eye.<br><br>The transformer design shall be such that the radiators and conservator can be mounted on either side of the tank. |
| **5.10** | **GASKET** | 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. |
| **5.11** | **VALVES** | a) 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.<br><br>b) Suitable means shall be provided for locking the valves in the open and close positions. Provision is not required for locking individual radiator valves.<br><br>c) Each valve shall be provided with the indicator to show clearly the position of the valve.<br><br>d) All valves flanges shall have machined faces.<br><br>e) All valves in oil line shall be suitable be suitable for continuous operation with transformer oil at 100°C<br><br>f) 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.<br><br>g) A valve or other suitable means shall be provided to fix the on line dissolved gas monitoring system to facilitate continuous dissolved gas analysis. The location & size of the same shall be finalized during detail engineering stage.<br><br>g) 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. 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.<br><br>h) All the valves to be compatible for NIFPS on OLTC & Main tank. The no of valves shall be as required for NIFPS. |

**5.12 INSULATION**

5.12.1 The dielectric strength of the winding insulation and of the bushings shall conform to the values given in IS 2026 (latest version) or IEC Publication No.76.

5.12.2 For rated system voltage 36kV and 12kV the following impulse test voltage shall be offered.

| System voltage | Impulse Test Voltage |
|---|---|
| 12kV | 75 kV |
| 36kV | 170kV |

5.12.3 The transformer shall be capable of operating continuously at its normal rating without Exceeding temperature limits as specified below:

| | **Type of cooling** | **Temperature rise** |
|---|---|---|
| 1 Winding | Natural Ester-oil Air natural (KNAN) | 55 deg.C |
| 2 Oil | | 50 deg.C |

**5.13 ACCESSORIES**

5.13.1 Each transformer shall be provided with the following accessories:

a) **Dial Type Thermometers for Oil (OTI)**

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.

b) **Winding Temperature Indicator (WTI) in one winding of each HV & LV phase as described below:**

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. 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 KNAN (Oil Natural and Air Natural) Thus WTI shall have 4 independent NO contacts for alarm and trip.

c) **Equipment's 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.

d) **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.
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.

All digital outputs for remote annunciation/control/DAS shall be provided with 2 changeover (NO) contacts for alarm condition and two changeover (NO) contacts for trip condition. The OTI & WTI shall be provided with micro switches, instead of mercury switches for alarm and trip purpose. All

the interconnected wiring between TJB, Marshalling box and OLTC etc shall be done by the bidder and schematics drawings of the same shall be supplied.

e) **One magnetic-type oil-level gauge** each in Main Tank and OLTC Tank with low and high level alarm contacts for main tank MOG and low level alarm for OLTC tank MOG and a dial showing minimum, maximum and normal oil levels. The gauge shall be readable from the transformer base level. It should have cable disconnecting facility at top of MOG, to facilitate testing of MOG. Along with MOG, prismatic type oil level indicator (glass window) shall also be provided on conservator.

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

| Sr no | DESCRIPTION | UNIT | REQUIREMENTS |
|---|---|---|---|
| 1 | Mounting Pad Diameter | Mm | 150 |
| 2 | Electric Switch | | Two no's Micro Switches / Mercury switch |
| 3 | Contact Rating | | 5 Amps 240V AC, 0.25 Amp 220V 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 | As per tender requirement |
| 16 | Packing | | Supplier shall ensure that the equipment covered by this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner so as to protect the equipment from damage in transit. |
| 17 | Marking | | The unit shall be appropriately marked as "PROPERTY OF TATA POWER" 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 of Transformer. In case any defects are found, the vendor shall replace the product free of cost. |
| 19 | Test Reports | | Test certificates to be provided:<br>1) Specified levels.<br>2) Switch operation<br>3) HV Test<br>4) Leakage Test<br>5) Insulation Test |
| 20 | Acceptance test | | Following tests shall be carried out:<br>1) Specified levels<br>2) Switch operation<br>3) HV Test<br>4) Leakage Test<br>5) Insulation Test |

f) One oil filling valve (inlet)
g) One oil drain valve
h) One filter valve located at the top of the tank on the HV side.
i) Oil sampling valves.
j) Pressure relief device

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

**General Technical Requirements for PRV:**

| Sr no | DESCRIPTION | UNIT | REQUIREMENT |
|---|---|---|---|
| 1 | Operating pressure | | 0.56 Kg/sq cm |
| 2 | Port opening diameter | | 150 mm |
| 3 | Operating time | | Instantaneous |
| 4 | Contact rating | | 3A at 250 V AC/DC magnetic blowout micro switch |
| 5 | Operating temperature | | 0 to 100 degree celcius |
| 6 | Valve resetting | | Automatic |
| 7 | Switch | | Limit switch DPDT |
| 8 | Accuracy class | | +/-1 % |
| 9 | Switch resetting | | Manual |
| 10 | Number of switch | | 1 limit switch |
| 11 | Mechanical protection degree | | IP67 |
| 12 | Suitable for transformer rating | MVA | As per tender |
| 13 | Cable Entry | | 1” conduit |
| 14 | Packing | | Supplier shall ensure that the equipment covered by this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner so as to protect the equipment from damage in transit. |
| 15 | Marking | | The unit shall be appropriately marked as "PROPERTY OF TATA POWER" and with the name of the vendor, Manufacturer type/ serial no. and year of manufacturing at suitable location. |
| 16 | Warranty | | 2 years from the date of purchase of Transformer. In case any defects are found, the vendor shall replace the product free of cost. |

| | | | |
|---|---|---|---|
| 17 | Test Reports | | Test certificates to be provided :<br>1) Protection Class.<br>2) Cold & Dry Test<br>3) Vibration Test<br>4) Salt spray Test<br>5) Micro switch rating Test |
| 18 | Acceptance test | | Following tests shall be carried out:<br>1) Physical Test- Dimensions<br>2) Switch operation test<br>3) Valve operation test<br>4) Leakage Test<br>5) Insulation Test |

**k) 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. Buchholz relay should be provided with test / service and on / off position. Buchholz Relays should be according to the following general technical parameters as mentioned in below table.

| Sr 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 48V to 220V DC. |
| 2 | No. of Switching systems | | 2 |
| 3 | Suitable for Transformer Rating | MVA | As per tender |
| 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/cm2 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/cm2 for 4 hours - There shall not be any leakage or mechanical damage |
| 20 | Mechanical Strength Test | | With oil at 8 kg/cm2 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 |

**n) Oil Surge relay** (OSR) to be of magnetic reed with potential free contact to be used for 48 V to 220 V DC. Following general technical parameters as mentioned in below table.

| Sr 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 48V to 220V DC |
| 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/cm2 for 15 minutes, |
| 16 | High Voltage Test | | Shall be able to withstand 2000 V at 50 Hz for 1 minute |
| 17 | Insulation Resistance Test | | Shall be Greater than 10 Mega ohms with 500 V megger |
| 18 | Porosity Test | | With oil, at 1.5 kg/cm2 for 4 hours - There shall not be any leakage or mechanical damage |
| 19 | Mechanical Strength Test | | With oil at 8 kg/cm2 for 1 minute |
| 20 | Resistance of the Switch | | Not to exceed 0.1 ohm across the electrodes of magnetic switch |
| 21 | Cable entry in terminal box | | From bottom side |

m) Radiators shall be complete as described in clause 5.9.
n) Oil Preserving Equipment
o) Eye bolts and lugs on all parts for ease of handling.
p) Two grounding terminals.
q) Diagram and rating plate.
r) 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.

s) Separate tank mounted marshalling box for terminal blocks for current transformer secondary only with Cable conduits for cables from devices to marshalling box.

t) Provision shall be made for installing resistance temperature detectors for temperature recording instruments arranged separately for the following. Hot oil Winding hot spot

u) Two Eco-friendly silica gel breathers (8 kg) each of 100% capacity for main tank.

v) Inspection covers for transformer inspections on all phases (on vertical plane)

w) Separate contacts for OSR relay in marshalling box to be provided.

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 220V Volts DC supply. Any other accessories or appliances recommended by the Bidder for the satisfactory operation of the transformers shall be supplied.

| | | |
|---|---|---|
| **5.14** | **UNDER CARRIAGE** | The transformer tank shall be supported on a structural steel base equipped with forged steel or cast steel single flanged wheels suitable for moving the transformer filled with oil. Jacking pads shall be provided. It shall be possible to change the direction of the wheels through 90 deg. when the transformer is lifted on jacks to permit movement of the transformer both in longitudinal and transverse directions.<br>Pulling eyes shall be provided to facilitate moving the transformers and they shall be suitably braced in a vertical direction so that bending does not occur when the pull has a vertical component. |
| **5.15** | **MARSHALLING BOX** | 5.15.1 Marshalling Box suitable for distribution of 3 phase, 4 wire, 415 V power to various equipment shall be provided. Separate ground mounted marshalling box shall be provided for radiator banks, WTI, OTI, transducers, at least two (2) sets of 4-20 mA converter cum indicator etc and similarly tank mounted marshalling box shall be provided for HV/LV CT cable terminals. The marshalling box should include Control & indication circuit with 220V DC supply. All cables and conduits between the transformer and control cabinet shall be included in the scope of supply by bidder. All the wiring shall have provision for connection to SCADA. Heater with temperature control shall be provided to prevent moisture condensation.<br><br>5.15.2 Two sets of independent, potential free contacts shall be provided for various alarms/trips as detailed below. The auxiliary voltage for alarm/ trip circuit shall be 220V DC. DC system is required for<br><br>a) Buchholz alarm<br>b) OTI alarm<br>c) WTI alarm (HV/LV based on WTI CT available)<br>d) MOG (main) alarm<br>e) MOG (OLTC) alarm<br>f) Buchholz trip<br>g) OTI trip<br>h) WTI trip (HV/LV based on WTI CT available)<br>i) OSR trip<br>j) PRV trip<br>k) AC supply fail<br>l) Motor Auto Trip<br><br>Two sets of spare potential free contacts shall be provided for all alarms for remote annunciation through Purchaser's SCADA panels Suitable transducers shall be provided for 4-20 mA signals for tap position indication to the purchaser's SCADA panel. The variation in output signals shall be linear for the complete tapping range. In addition to above, following potential free contacts/signals shall be provided in the marshalling box, for its interfacing with tap change control relay. Control voltage shall be universal 220V for AC and DC for relay. |

| S. No | Item | Make |
|---|---|---|
| 1. | Supply of ON Lamps, 3 no's R,Y,B | To be provided |
| 2. | Secondary of control transformer from OLTC | Terminals shall be provided in marshalling box. |
| 3. | Tap position Indicator | 4-20 mA Signal in marshalling box |
| 4. | Over current Relay contact | Potential free contact in marshalling box |

| | | |
|---|---|---|
| 5. | Local remote Switch in OLTC | Potential free contact in marshalling box |
| 6. | Raise Lower Switch | Potential free contact in marshalling box |
| 7. | Hand interlocking switch | Potential free contact in marshalling box |
| 8. | Tap change in progress | Potential free contact in marshalling box |
| 9. | Odd Even Switch | Potential free contact in marshalling box |
| 10. | Maximum Position reached | Potential free contact in marshalling box |
| 11. | Maximum Position Reached | Potential free contact in marshalling box |
| 12. | OTI | 4-20 mA Signal in marshalling box |
| 13. | Annunciation<br>- Oil level Low & high (Main)<br>- Oil Level low (OLTC)<br>- Winding temp. High (HV + LV)<br>- Oil Temp High<br>- B' Relay trip<br>- Winding temp trip (HV+LV)<br>- Oil temp trip<br>- B' relay trip<br>- PRV trip for main & OLTC both<br>- OSR trip | Potential free contact in marshalling box |
| 14. | Auto Manual Selector switch | Potential free contact in marshalling box |
| 15. | Supply ON lamp 3 nos. (R,Y,B) | To be provided |
| 16. | Secondary of control Transformer from OLTC | TBs shall be provided |
| 17 | WTI, OTI, TPI, Transducers & 4-20mA converter / indicator unit for each of these indicators. (two sets of 4-20 mA signal to be provided for each indicator) | Equipment and TBs shall be provided. OTI & WRI temp. Probe shall be suitable to fit in to the existing arrangement on top of transformer main tank. The capillary length of OTI & WTI shall be minimum 25 Metres. |
| 18 | Over load Relay (for OLTC motor) and its potential free contacts | Relay, contactors & TBs shall be provided (Relay suitability should be confirmed for the various rating of motors) |
| 19 | All wiring from OLTC to Marshalling box | Separate set of TBs shall be provided. |
| 20 | PRV of main tank and OLTC trip | Contactors shall be provided |

**5.15.3 Enclosure**

The Enclosure shall be weatherproof, sheet steel construction, not less than 3 mm thick. Degree of protection shall be IP 55 minimum with Canopy. It shall be provided with two hinged doors one at front and one at back with locking knobs facilities. The doors shall open through 180º. Doors shall have glass window for viewing of OTI & WTI from outside

when door is closed. Doors and glass windows shall have proper gaskets for vermin proof and dust tight arrangement. The glass window for Marshalling box to fitted from inside. Groove to be made from inside in the marshalling box to fit the glass. It shall be provided with detachable cable gland plate at bottom. Earthing pad (at two points) shall be provided for connection of earthing strip. Size of the earthing strip should be 50X6 mm, GI. All the links shall be of droppable type.

**5.15.4 Accessories**

All accessories shall be mounted properly in suitable channel inside the box. The MCBs shall be mounted on a DIN channel by a MS plate with cutout for MCBs knobs. This shall be covered by a hinged door on the front.

| S. No | Item | Make | Rating | Quantity |
|---|---|---|---|---|
| 1. | Main Incomer MCB 3 Pole | Siemens/ABB/L&T | 63A | 2 nos |
| 2. | 3 Pole MCB | Siemens/ABB/L&T | 06A | 12 nos |
| 3. | 3 Pole MCB | Siemens/ABB/L&T | 10A | 10 nos |
| 4. | 3 Pole MCB | Siemens/ABB/L&T | 16A | 10 nos |
| 5. | Connector/Terminals | Wago or Phonix, (Suitable for ring type lugs) | Suitable for 2.5 sq mm control cable | To accommodate all the wiring as mentioned below additional 10% terminals shall be provided spare. |
| 6. | Contactorts,Starter and Relays | Siemens,L&T,English Electric. | | |
| | | | | |

Power cable wiring of MCBs to individual contactors shall be done through good quality copper cable of suitable rating with ferrule marking and suitable lugs at both ends. 2.5sqmm stranded copper cable with ring type lugs shall be used for control cabling purpose. All instrument and wiring shall be completely accessible.

**5.15.5 Following Tests shall be carried out on the Marshalling Box**

a) Functional tests / 2KV withstand.
b) Dimensional checks.
c) Make and operation of contactors, relays.
d) Factory test report attached for bought out items.
e) Test for Enclosure Protection.

| TBs standardization for DSS Oil Filled Transformer MB BOX | | | | |
|---|---|---|---|---|
| No | From | Device | To ( Droppable TBs) | Purpose |
| 1 | Customer scope | 3 phase supply (R,Y,B,N) | T-1 & T-1a | |
| 2 | Customer scope | | T-2 & T-2b | |
| 3 | Customer scope | | T-3 & T-3c | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 4 | Customer scope | | T-4 & T-4n | |
| | | | 5 | T-1 | Single phase AC supply | T-5 | Heater & Light & Socket |
| | | | 6 | T-4 | | T-6 | |
| | | | 7 | T-2 | Single phase AC supply | T-7 | Transducers |
| | | | 8 | T-4 | | T-8 | |
| | | | 9 | OTI-Alarm | OTI | T-9,10 | Customer Use |
| | | | 10 | WTI HV-Alarm | WTI-HV | T-11,12 | Customer Use |
| | | | 11 | Buchh- Alarm | Buchholz Relay | T-13,14 | Customer Use |
| | | | 12 | WTI LV-Alarm | WTI-LV | T-15,16 | Customer Use |
| | | | 13 | MOG (Main)-Alarm | MOG (Main) | T-17,18 | Customer Use |
| | | | 14 | MOG (OLTC)-Alarm | MOG (OLTC) | T-19,20 | Customer Use |
| | | | 15 | OTI-Trip | OTI | T-21,22 | Customer Use |
| | | | 16 | WTI HV-Trip1 | WTI HV | T-23,24 | Customer Use |
| | | | 17 | WTI HV- Trip2 | WTI HV | T-25,26 | Customer Use |
| | | | 18 | Buchh-Trip | Buchholz Relay | T-27,28 | Customer Use |
| | | | 19 | WTI LV-Trip1 | WTI LV | T-29,30 | Customer Use |
| | | | 20 | WTI LV-Trip2 | WTI LV | T-31,32 | Customer Use |
| | | | 21 | OSR-Trip | OSR | T-33,34 | OLTC Trip |
| | | | 22 | PRV (Main)- Trip | PRV Main | T-35,36 | Customer Use |
| | | | 23 | PRV (OLTC)- Trip | PRV OLTC | T-37,38 | Customer Use |
| | | | 24 | PT-100 OTI | Resistor probe | T-39,40,41 | Transducers input |
| | | | 25 | 4-20mA O/P contact | OTI Transducer | T-42,43 | relay |
| | | | 26 | 4-20mA O/P contact | OTI Transducer | T-44,45 | relay |
| | | | 27 | PT-100 WTI HV | Resistor probe | T-46,47,48 | Transducers input |
| | | | 28 | WTI CT HV | WTI CT HV | T-49,50 | WTI relay |
| | | | 29 | | | T-51 | Ground |
| | | | 30 | 4-20mA O/P contact | WTI HV Transducer | T-52,53 | relay |
| | | | 31 | 4-20mA O/P contact | WTI HV Transducer | T-54,55 | relay |
| | | | 32 | PT-100 WTI LV | Resistor probe | T-56,57,58 | Transducers input |
| | | | 33 | WTI CT LV | WTI CT LV | T-59,60 | WTI relay |

| Rev No. | Prepared By & Date | Checked By & Date | Approved for Issue By & Date |
|---|---|---|---|
| R00 | Ketan Jadhav | Ajay V. Potdar | Ravindra M. Bhanage |
| | 05/02/24 | 05/02/24 | 05/02/24 |

| | | | | | |
|---|---|---|---|---|---|
| 34 | | | T-61 | Ground |
| 35 | 4-20 mA O/P contact | WTI LV Transducer | T-62,63 | Customer Use |
| 36 | 4-20 mA O/P contact | WTI LV Transducer | T-64,65 | Customer Use |
| 37 | LV NCT | Neutral CT | T-66,67,68 | Customer Use |
| 38 | | | T-69 | Ground |
| 39 | Buchh-Trip | Buchholz Relay | T-70,71 | Fire Protection System |
| 40 | OSR-Trip | OSR | T-72,73 | Fire Protection System |
| 41 | PRV (Main)- Trip | PRV Main | T-74,75 | Fire Protection System |
| 42 | PRV (OLTC)- Trip | PRV OLTC | T-75,77 | Fire Protection System |
| 43 | spare | | T-78 | spare |
| 44 | spare | | T-79 | spare |
| 45 | spare | | T-80 | spare |
| 46 | spare | | T-81 | spare |
| 47 | spare | | T-82 | spare |
| 48 | spare | | T-83 | spare |
| 49 | spare | | T-84 | spare |
| 50 | spare | | T-85 | spare |

Note:

1) If a device is not used in transformer the TBs for that device must be incorporated as spare in black color.
2) The spare TBs (T-78 to T-85) must be of default color.
3) Any new scheme or spare contacts of any device to be wired by O&M after T-85.

Do not Disturb TBs sequence from T-1 to T-85.

**5.16 OLTC Conservator Tank**

The OLTC conservator tank assembly shall consist of the following:
a. Tank with air release valve on top.
b. Prismatic Oil level indicator with red color float.
c. Magnetic Oil Level Indicator (MOG), round in shape having a diameter of 100 mm.
d. Bend assembly with flange – This includes two pipes, one connecting tank with OSR and another connecting OSR with OLTC along with two shut off valves. The diameter of this pipe is 25 mm for both the tanks. The complete assembly formed after attaching both the pipes to OSR and connecting with the tank should be at an angle of 5 degrees with respect to the horizontal. Also, the pipe should be offset from the tank at an angle of 32 degrees in the horizontal plane.
e. Eco Silica gel breather along with the explosion vent assembly.
f. Mounting structure with eight nut bolts (S/S) for attachment.
g. Tank shall be fabricated from good commercial grade low carbon steel.
h. All joints, bolted or flanged, shall have machined matching surfaces/inner edges with smooth finish, to ensure leak proof joints.

| | | |
|---|---|---|
| | | i. The inside surface of the tank shall be painted with one coat of hot oil resistant varnish with two coats of red oxide zinc chromate primer conforming to IS:2074 followed by two coats of fully glossy finishing paint conforming to IS:2932 and yellow in color.<br>j. The outside surface shall be painted with two coats of red oxide zinc chromate primer conforming to IS: 2074 followed by two coats of fully glossy finishing paint conforming to IS: 2932 of shade RAL6037 green.<br>k. It should be suitable for CTR FQ16 OLTC.<br>l. Two lifting hooks (each having 2 time capacity) should be provided. |
| **5.17** | **ANTI RUSTING/ CORROSION TREATMENT** | 5.17.1. 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.<br><br>5.17.2. Finishes on transformer and appurtenant parts, edges (exposed to atmosphere):- 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).<br><br>5.17.3. For all radiators the following painting procedure shall be followed. The metal spray (99.95% assay zinc) to a thickness about 120 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.<br><br>5.17.4. 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.<br><br>5.17.5. The Bidder shall submit a Quality Plan, giving the parameters and checking methods, (major, critical, minor).<br><br>5.17.6. The paint shade used shall be shade RAL 6037.<br><br>The following shall be the check points for the metal spray of Radiators:-<br>a) Metal Spray<br>b) Surface preparation<br>c) Chemical analysis of actual material used for spray (batch wise identification).<br>d) Coating Process (the first trial job will be witnessed to see if the written procedure is followed).<br>e) Coating thickness test, adhesion test as per BS.<br>f) Repair area classification major or minor and accordingly the repair from blasting onwards otherwise<br><br>5.17.7. Bidder may quote for galvanized radiators instead of metal spray radiators as an alternative. |
| **5.18** | **CENTRE OF GRAVITY** | The center of gravity of the assembled transformer shall be low and as near the vertical center line as possible. The transformer shall be stable with or without oil. If the center of gravity is eccentric relative to track either with or without oil, its location shall be shown on the outline drawing. |

| | | |
|---|---|---|
| **5.19** | **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. |
| **5.20** | **PAINTING** | 5.20.1. 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.<br><br>5.20.2. Before shipment all steelwork not under oil shall be painted with a primary coat of anticorrosive paint of durable nature and two coats of battleship grey paint (Shade RAL 6037). 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.<br><br>5.20.3. Painting of Marshalling box: Two coats of red oxide primer & two coats of synthetic enameled paint after chemical treatment.<br><br>5.20.4. Metal parts not accessible for painting shall be made of corrosion resistant material.<br><br>5.20.5. 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 RAL 6037<br><br>5.20.6 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).<br><br>5.20.7. 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: |

| Sr. 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<br>Outside | 01<br>01 | 30<br>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 |

Painting shall not affect by weather changes & performance against pilling out or fading etc. to be guaranteed for 5 Years.

**5.21 TRANSFORMER OIL**

1. All transformers shall be filled with new, unused, clean, standard ester oil in compliance with IEC 62770. The use of recycled oil is not acceptable.
2. Oil shall be filled under vacuum before filling it shall be filtered and tested. The test parameters should be as per the table below:

| Sr. No | Characteristics | Method | Limits |
|---|---|---|---|
| 1 | Appearance | IEC 62770<br>ASTM-D1524 | The oil shall be clear and transparent and free from suspended matter or sediments |
| 2 | Viscosity, mm2/sec<br>@ 100 °C<br>@ 400 °C | ISO 3104<br>ASTM D445-19 | <br>Max 15<br>Max 50 |
| 3 | Pour Point | ISO 3104<br>ASTM D445-19 | Max -10° C |
| 4 | Water Content (mg/kg) (PPM) | IEC 60814<br>ASTMN D1533-1 | Max 200 |
| 5 | Density (gm/ Cm3) @20°C | ISO 3675<br>ASTM D1298-12 | Max 0.96 |
| 6 | Dielectric breakdown voltage (2.5 mm gap) | ASTM 1816-12<br>IEC 60156 | Min 60 KV |
| 7 | Dissipation Factor Tan Delta @ 90°C, 50 Hz | IEC 60247 | Max 0.05 |
| 8 | Flash Point (°C) | ISO 2719<br>ASTM D92-18 | Min 275 |
| 9 | Fire Point (°C) | ISO 2592<br>ASTM D92-18 | Min 300 |
| 10 | Soluble acidity, mg KOH/gm | IEC 62021-3<br>ASTM D974-12 | Max 0.06 |
| 11 | Corrosive sulphur | | Non-Corrosive |
| 14 | Specific Heat at 20 °C (J/kg K) | | Min 1800 |
| 15 | Thermal Conductivity @ 20 °C (W/m K) | | 0.18 |
| 17 | Coefficient of Thermal Expansion (/°C) | | 0.00074 |
| 20 | Auto ignition Point (°C) | | Min 350 |
| 21 | Classification | | K2 |
| 22 | Biodegradable | | Yes |
| 24 | Net Calorific Value (MJ/kg) | | 38.3 |

| | | |
|---|---|---|
| 6.0 | NAME PLATE AND MARKING: | **6.1 RATING PLATE:**<br>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. **QR code shall be provided on name plate. QR code shall content the name plate details, approved GTP/Drawing and a video of overall functionality of transformer & associate components.** 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 TATA POWER". 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:<br><br>a) Type of transformer (Two Winding Transformer)<br>b) Relevant standard.<br>c) Manufacturer's Name<br>d) Manufacturer's Serial No.<br>e) Year of Manufacture<br>f) No. of phases<br>g) Rated kVA<br>h) Rated frequency<br>i) Rated Voltage<br>j) Rated current<br>k) Connection symbol<br>l) Percentage impedance voltage at rated current.<br>m) Type of cooling (KNAN).<br>n) Total Mass.<br>o) Mass and Volume of insulating Oil.<br>p) Connection diagram showing the internal connections.<br>q) Temperature rise<br>r) Insulation levels of the windings, including neutral end of windings with non-uniform insulation.<br>s) Transportation weight<br>t) Untanking weight.<br>u) Core and windings weight<br>v) Table giving the tapping voltage, tapping current and tapping power for each tapping.<br>w) Values of short circuit impedance on the extreme tappings and on the principal tapping and indication of the winding to which the impedance is related.<br>x) A table of all guaranteed particulars.<br>y) Quantity of oil required for normal filling.<br>z) HV and LV phase to phase clearances.<br>aa) Vector diagram<br>bb) Indication of the winding which is fitted with tapping.<br>cc) Table giving the tapping voltage, the tapping current and the tapping power of each winding, for each tap.<br>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.<br>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.<br>ff) Guaranteed No Load & Full Load losses.<br>gg) PO no & Guarantee clause. |

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| R00 | Ketan Jadhav | Ajay V. Potdar | Ravindra M. Bhanage |
| | 05/02/24 | 05/02/24 | 05/02/24 |

**6.2 Valve Schedule Plate**

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

**6.3 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)

**6.4 Marshalling Box:**

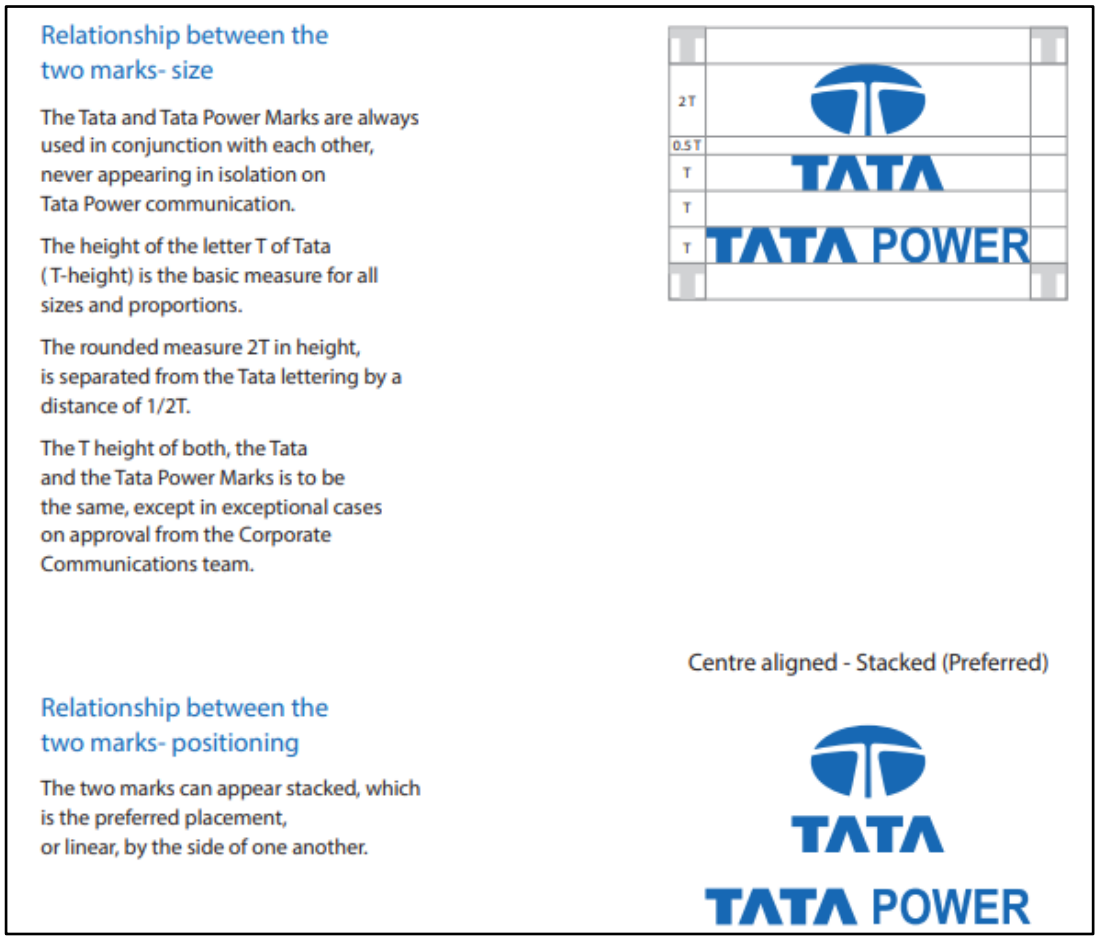
a) Manufacture's Name.
b) Manufacture's Serial No.
c) Year of Manufacturing.
d) Purchase Order No.

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

**6.5 Oil filling instruction plate for conservator:**

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

**6.6 Logo** Size – 300mm X 300mm.

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| **7.0** | **TESTS** | 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. The factory visit for should be arranged for witnessing transformer stage inspection. 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<br><br>**7.1 Routine tests**<br><br>a) Measurement of Winding Resistance<br>b) Measurement of voltage ratio, polarity and check of voltage vector relationship<br>c) Measurement of impedance voltage / short-circuit impedance (Principal tapping) and Load Loss.<br>d) Measurement of No-Load Loss and excitation Current (Losses at 90, 100 and 110% of rated voltage).<br>e) Measurement of insulation resistance.<br>f) Dielectric Test. |

g) Test on -Load Tap Changer.
h) Measurement of Zero-sequence impedance on three phase transformer.
i) Oil Pressure test on completely assembled transformer at 0.35kg/sqcm for 8 hrs.
j) Bushing shall be tested for Capacitance and Power factor and shall meet the manufacture's requirement.
k) All CTs and resistance of image coil for winding temperature indicator shall be checked for ratio test, polarity and knee point voltage test.
l) Determination of Capacitances and dissipation factor winding-to-earth and between windings.
m) Magnetic balance test.
n) Measurement of Magnetizing current at low voltage.
o) Vacuum withstand test on tanks and radiators.
p) Physical Verification of complete Transformer with all assembly including test rollers, radiators, cable boxes etc.
q) The total Losses shall comprise of the No Load Losses & Load 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.
r) Voltage Regulation at rated load and at unit, 0.9, 0.8 lagging power factor.
s) Measurement of Acoustic Noise Level.
t) Functional tests on auxiliary equipment:-
i. Test on OTI and WTI
ii. High Voltage test on insulation test for Auxiliary Wiring.

u) 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

v) Induced over voltage withstand test.
w) Separate Source voltage withstand test.
x) BDV and moisture content of oil in transformer (Type-2 oil).

**7.2 Acceptance tests**

a) At least 10% transformer of the offered lot (minimum of one) shall be subjected to all the tests mentioned under the section ' ROUTINE' in presence of Purchaser's representative at the place of manufacture before dispatch without any extra charges. The testing shall be carried out in accordance with IS:2026.
b). Oil Leakage test for acceptance shall be conducted at pressure of 0.35kg/sq.cm for one hour.
c). Temperature rise test As per IS 2026 (Part 2) Clause no.4]
d). At stage inspection - Checking of weights, 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.
e). At Final inspection, the incoming raw material and its movement/consumption record in the related jobs of Tata power will be verified by inspecting officer. In case of any deviation or non-availability of such records, the offered lot may get rejected.

**7.3 Type Tests**

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

a) Measurement of winding resistance.
b) Measurement of voltage ratio and check of voltage vector relationship.
c) Measurement of impedance voltage / short-circuit impedance (Principal tapping) and load loss.
d) Measurement of no load loss and current.
e) Measurement of insulation resistance.
f) Dielectric Test
**g) 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.**
h) Tests on on-load tap-changer.
**i) Short Circuit withstand test**
j) Test to verify IP55 of Marshalling and cable boxes.
**k) 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.**

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

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

**7.5** Special Test: The following tests shall be carried out by mutual agreement between the purchaser and the bidder. All Test shall be done as per the relevant standard. Test certificates shall be submitted for bought out items. High voltage withstand test shall be performed on auxiliary equipment and wiring after complete assembly.

a) Measurement of the harmonics of the No-Load Current.
b) Determination of transient voltage transformer characteristics.
c) Measurement of insulation resistance to earth of the windings, and / or measurement of Dissipation factor (tan δ) of the insulation system capacitances. (These are reference values for comparison with later measurement in the field. No limitation for the values are given here.).
d) Lightning impulse test on Neutral terminals.
e) Long duration induced AC voltage test (ACLD) transformer winding 36kV <Um≤ 170kV.
f) Magnetic circuit (isolation) test.
g) SFRA Test.

**7.6 TESTS AT SITE**

After erection at site, the transformers shall be subjected to the following tests and the bidder shall guarantee results of test certificates under service conditions.

a) Measurement of winding resistance.
b) Measurement of voltage ratio and check of voltage vector relationship.
c) Measurement of magnetizing current.
d) Magnetic balance test on three phase transformer.
e) Magnetic circuit (isolation) test.
f) Measurement of short circuit Impedance at low voltage.

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| | | g) Insulation resistance measurement.<br>h) Dielectric Test on oil.<br>i) Determination of Capacitances and dissipation factor winding-to-earth and between windings.<br>j) Test on other Auxiliaries.<br>k) No-Load and Excitation current.<br><br>This is for bidder's information that tests at site may be in bidder's scope based on mutual agreement between bidder and purchaser's. However, in any case bidder shall be required to send their engineer to confirm that the erection & commissioning is done in a satisfactory manner.<br><br>**7.8 FURTHER TESTS**<br>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. |
| **8.0** | **TYPE TEST CERTIFICATES** | The Bidder shall furnish the type test certificates of the Two Winding Power Transformer for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI / ERDA as per the relevant standards. Type tests should have been conducted in certified Test laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to the Purchaser. |
| **9.0** | **PRE-DESPATCH INSPECTION** | 9.1 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. Bidder shall grant free access to the places of manufacture to Purchaser's representatives at all times when the work is in progress. Inspection by the Purchaser or its authorized representatives shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by Purchaser.<br><br>Following documents shall be sent along with material:<br>a) Test reports<br>b) MDCC issued by Tata Power<br>c) Invoice in duplicate<br>d) Packing list<br>e) Drawings & catalogue<br>f) Guarantee / Warrantee card<br>g) Delivery Challan<br>h) Other Documents (as applicable)<br><br>9.2 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:<br>a) Invoice of supplier.<br>b) Mill's certificate |

c) Packing List.
d) Bill of Landing
e) Bill of entry certificate by custom.

9.3 To ascertain the quality of the transformer oil, the original manufacturer's tests report shall be submitted at the time of inspection. Arrangements shall also be made for testing of transformer oil, after taking out the sample from the manufactured transformers and tested in the presence of purchaser's representative.

9.4 To ensure about the quality of transformers, the inspection shall be carried out by the purchaser's representative at following stages;-

a) Stage Inspection I - Online anytime during receipt of raw material and manufacture/assembly whenever the purchaser desires, especially transformer tank inspection.
b) Stage inspection II – the transformer shall be submitted for the routine/ acceptance test in presence of purchaser's representative at the place of manufacturing during manufacture of the transformer, without any extra charges. The testing shall be carried out in accordance with IS: 1180 and IS : 2026.Checking of weights, dimensions, fitting, and accessories, tank sheet thickness, oil quality material, finish & workmanship as per GTP/QA plan and contract drawings. Physical verification of core coil assembly and measurement of flux density of one unit of each rating, in every inspection.
c) Final Inspection:-All test as per specified as clause 7

9.5 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 and a few assembly have been completed, the Bidder shall intimate the purchaser in this regard, so that an officer for carrying out such inspection could be deputed, as far as possible within seven days from the date of intimation. During the stage inspection a few assembled core shall be dismantled (only in case of CRGO material) to ensure that the CRGO laminations used are of good quality. 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.

9.6 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.

9.7 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. 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 Active Inspection during Acceptance Tests.

9.8 The bidder shall provide all services to establish and maintain quality of workmanship in his works and to ensure the mechanical / electrical performance of components, compliance with drawings, identification and acceptability of all materials, parts and equipment as per latest quality standards of ISO 9000.

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| | | 9.9 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. |
| **10.0** | **INSPECTION AFTER RECEIPT AT STORES** | 10.1 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.<br><br>10.2 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.<br><br>10.3 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.<br><br>10.4 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.<br><br>10.5 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.<br><br>10.6 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.<br><br>10.7 Test at Tata Power store: after receipt of transformers at Tata Power stores, following minimum tests will be carried out.<br>a) Total weight of the transformer. (It should be as per the offer, subjected to tolerance as per<br>approved drawings & GTPs)<br>b) Oil level in the transformer<br>c) Verifications of all the fittings.<br>d) Physical verification of all the transformers for any oil leakage, quality of painting etc.<br><br>10.8 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. |
| **11** | **GUARANTEE** | 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. 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. Bidder shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire |

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| | | 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. 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. |
| **12** | **PACKING** | 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.<br><br>12.1 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. Bidder to submit the shock absorber results for records.<br><br>12.2 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 become part of purchaser. 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.)<br><br>12.3 Provisions for monitoring of oil and gas pressure during transport and storage and a make-up Nitrogen cylinder shall be made. A shock recorder also shall be provided during transport. Bushings shall be packed in proper containers for transport.<br><br>12.4 Provisions for monitoring of Oil pressure during transport and storage and make-up oil shall be made. A shock recorder also shall be provided during transport. Bushings shall be packed in proper containers for transport.<br>All parts shall be adequately marked to facilitate field erection. Boxes and crates shall be marked with the contract number and shall have a packing list enclosed showing the parts contained therein.<br><br>**Note: One use plastic not to be used for packing of the material.** |
| **13.0** | **QUALITY CONTROL** | 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. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.<br><br>13.1 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. |

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| R00 | Ketan Jadhav | Ajay V. Potdar | Ravindra M. Bhanage |
| | 05/02/24 | 05/02/24 | 05/02/24 |

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| | | a) 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. List of tests normally carried out on raw materials in the presence of Bidder's representative, copies of test certificates.<br>b) Information and copies of test certificates as in (I) above in respect of bought out accessories<br>c) List of manufacturing facilities available.<br>d) Level of automation achieved and list of areas where manual processing exists.<br>e) List of areas in manufacturing process, where stage inspections are normally Carried out for quality control and details of such tests and inspection.<br>f) 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 posses 0.1 class instruments for measurement of losses.<br>g) Quality Assurance Plan (QAP) with hold points for purchaser's inspection.<br><br>13.2 The successful Bidder shall within 30 days of placement of order, submit following information to the purchaser.<br>a) List of raw materials as well as bought out accessories and the names of sub-Suppliers selected from those furnished along with offer.<br>b) Type test certificates of the raw materials and bought out accessories.<br>13.3 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. |
| **14.0** | **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.<br>The bidder shall have minimum testing facilities in house for following:<br><br>a) Heat run test<br>b) SFRA - SFRA compatibility with Omicron & Dobell<br>c) Pre dispatch inspection as per clause no. 9 above. |
| **15.0** | **MANUFACTURING ACTIVITIES** | The successful bidder will have to submit first GTP & Drawing with 7 days from placement of outline agreement for approval and complete the approval process within 14 days of outline agreement. The date of Code -2/ Code-1 approval given by TATA Power will be treated as first day for assessment of LD (if applicable). |
| **16.0** | **SPARES, ACCESSORIES AND TOOLS** | Bidder shall provide a list of recommended spares with quantity and unit prices for 5 years of operation after commissioning. 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. The Purchaser may order additional spares at any time during the contract period at the rates stated in the Contract Document.<br><br>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.<br><br>The bidder shall also provide the following mandatory spares along with the transformer.<br>i) HT Bushing (1 no.)<br>ii) LT Bushing (1no.)<br>iii) Neutral Bushing (1 no.)<br>iv) Bucholtz Relay (1 no.)<br>v) Valves (1 Set)<br>vi) OTI, WTI (1 each) |

vii) PRV (1 no); OSR (1 no); MOG (1 no)

Spares shall be delivered to stores.

**17.0 DRAWINGS AND DOCUMENTS**

Following drawings and documents shall be prepared based on Purchaser's specifications and statutory
requirements and shall be submitted with the bid:

a) Completely filled in Technical Particulars
b) General description of the equipment and all components including brochures.
c) General arrangement for Transformer
d) Foundation plan
e) Bill of material
f) Experience List
g) Type test certificates

After the award of thesoft copies of drawings, drawn to scale, describing the equipment in detail shall be forwarded for purchaser's approval. Test certificates shall be submitted after the final approval of the same to Purchaser.

**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 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 blocks 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 | √ | √ | √ |

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| | views showing the duct sizes, cooling pipes etc. | | | |
| 18 | Large scale drawings of high and low tension windings of the transformers showing the nature and arrangement of insulation and terminal connections. | √ | √ | √ |
| 19 | Bushing drawing and specifications. | √ | √ | √ |
| 20 | Crane requirement for assembly and dismantling. | | √ | √ |
| 21 | Overhead Conductor Connections. | | √ | √ |
| 22 | Foundation drawing of transformer, radiator supports, etc. | √ | √ | √ |
| 23 | Valve Schedule details | √ | √ | √ |
| 24 | HV , LV Bushing fixing and connection Details | | √ | √ |
| 25 | Radiator drawing and their fixing arrangement. | | √ | √ |
| 26 | 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 diagram for all elements | √ | √ | √ |
| 34 | Valve Schedule | √ | √ | √ |
| 35 | Test report of all bought out elements. | √ | √ | √ |

All the documents & drawings shall be in English language. Soft copied of installation and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices shall be provided by bidder.

**List of Calculations to be submitted:**

All the calculations shall be step by step showing the use of formulas and other practical considerations to be provided by bidder. 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.

ii. Resistance Calculation (75 deg. C)
iii. Load Losses Calculation (75 deg. C)
iv. No load Loss Calculation.
v. Stray Loss Calculation.
vi. Weight of Copper (Bare and with Insulation also).

vii. Weight of Core.
viii. BH curve & Loss/Kg graph of core material offered.
ix. Flux Density calculations.
x. Efficiency vs Load curve of the offered design.
xi. Current Density Calculations.
xii. Short Circuit withstand.
xiii. Temperature Rise Calculations.
xiv. Cooling Calculations.
xv. Calculation sheet for Lifting lug design and mounting lug design.

**Additional Documents to be submitted :**
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.
iii. 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.

## 19.0 GUARANTEED TECHNICAL PARTICULARS

| Sr. No. | Description | Unit | As furnished by Bidder |
|---|---|---|---|
| 1 | Name & place of the manufacture | | |
| 2 | Applicable Standard | | |
| 3 | Service | | |
| 4 | Tank cover conventional/bell shaped | | |
| 5 | MVA rating:<br>a) HV<br>b) LV | <br>MVA<br>MVA | |
| 6 | Rated voltage:<br>a) HV<br>b) LV | <br>kV<br>kV | |
| 7 | No Load Current at Rated Voltage & rated Frequency | | |
| 8 | Rated frequency | Hz | |
| 9 | Number of phases | | |
| 10 | Connections: a) HV winding b) LV winding | | |
| 11 | Connection symbol: HV-LV | | |
| 12 | Tapings on HV winding ON Load<br>a)Range<br>b)Number of steps | | |
| 13 | For ON load taps, specify details of OLTC gear(incl. type & make) | | |
| 13.1 | Manual/automatic control | | |
| 13.2 | Remote/local control | | |
| 13.3 | If remote control, whether the remote Control cubicle included in Bidder's scope of supply | | |
| 13.4 | Voltage class of OLTC | | |
| 13.5 | Current rating of OLTC | | |

| | | | |
|---|---|---|---|
| 13.6 | a) Location of OLTC with respect to HV winding (attach sketch). b)Location of OLTC (In Tank/Outside Tank) | | |
| 13.7 | Whether separate tap winding provided for OLTC | | |
| 13.8 | Whether Selector and diverter chamber are separate | | |
| 13.9 | Total oil in the OLTC – in selector switch -- In diverter switch | | |
| 14. | Reference ambient temperatures | | |
| 13.1 | Maximum ambient air temperature | °C | |
| 13.2 | Maximum daily average ambient air temperature | °C | |
| 13.3 | Maximum yearly weighted average ambient temperature | °C | |
| 13.4 | Minimum ambient air temperature | °C | |
| | Type of cooling-KNAN | | |
| 15 | Winding | | |
| 15.1 | Maximum current density in winding | Amps/m m2 | |
| 15.2 | Description of winding insulation | | |
| 15.3 | Nature of insulation | Class | |
| 15.4 | Details of winding and winding conductor | | |
| 16. | Tank | | |
| 16.1 | Approximate thickness | | |
| | I. Side<br>II. Bottom<br>III. Cover | Mm<br>Mm<br>Mm | |
| | Material of tank | | |
| 17 | Maximum temperature-rise above an ambient of (deg.C)<br>a)Top oil<br>b)Windings<br>c)Temperature Gradient between Oil and Winding | <br>°C<br>°C<br>°C | |
| 18 | Total loss at rated voltage at principal tapping and rated frequency | KW | |
| 19 | Component losses: at 90%, 100%, and 110% : | | |
| 19.1 | No load loss at rated voltage on principal tapping and at rated frequency :<br>i)at Rated V<br>ii)at 110% Rated V | <br>kW<br>kW | |
| 19.2 | Load loss at rated current for the principal tapping at 75°C excluding cooler losses: (kW) | kW | |
| 19.3 | Auxiliary losses at rated current for principal tripping: (kW) Note: Tolerances if any shall be mentioned. Load losses should be specified for full MVA rating | kW | |
| 20 | Impedance voltage at rated current for the principal tapping HV – LV (Percent) Note: (The above impedance values shall be on full MVA rating of transformer i.e. For 2 winding transformer on 50 MVA base ) | % | |

| | | | | |
|---|---|---|---|---|
| | 21 | Reactance at rated current and rated frequency (On full MVA rating of transformer i.e. For 2 winding transformer on 50 MVA base )<br>i) HV – LV<br>ii) No load current at rated voltage and rated frequency | %<br><br> | |
| | 22 | a)Partial discharge level<br>b)Noise level<br>c)Harmonic content in charging current | | |
| | 23 | Insulation level | | |
| | 23.1 | Separate source power-frequency voltage withstand<br>i)HV winding<br>ii)LV winding<br>iii)LV neutral | kV rms<br>kV rms<br>kV rms | |
| | 23.2 | Induced over voltage withstand<br>i)HV winding<br>ii)LV winding<br>iii)LV neutral | kV rms kV rms kV rms | |
| | 23.4 | Full wave lightning impulse withstand<br>i)HV winding<br>ii)LV winding<br>iii)LV neutral | <br>kV peak<br>kV peak<br>kV peak | |
| | 23.5 | Uniform/Graded Insulation<br>i)HV winding<br>ii)LV winding<br>iii)LV neutral | <br>kV peak<br>kV peak<br>kV peak | |
| | 24 | a)External short circuit withstand capacity<br>b)External short circuit withstand capacity<br>i) for HV side<br>ii) for LV side<br>c)Duration of external short withstand capacity | MVA<br>kA in Sec. | |
| | 25 | Efficiencies at 75 deg.C at unity power factor :<br>a) At full load<br>b) At 3/4 full load<br>c) At 1/2 full load | <br>%<br>%<br>% | |
| | 26 | a) 415 V single phase short circuit impedance<br>b) Percentage variation between phases. | | |
| | 27 | Regulation at full load at 75 deg. C<br>a)At unity power factor<br>b)At 0.8 power factor lagging | <br>%<br>% | |
| | 28 | Minimum clearances between live parts in air<br>a) HV<br>Phase to Phase<br>Phase to ground<br>b) LV<br>Phase to Phase<br>Phase to ground<br>c) Neutral<br>Phase to Phase | | |

| | | | |
|---|---|---|---|
| | Phase to ground | | |
| 29 | **A)Equipment for KNAN Cooling**<br>a)State<br>i)Radiators on main tank | | |
| 30 | Whether tap changer is mounted vertically or horizontally. (Details of OLTC, Location with respect to HV winding to be attached) | | |
| 31 | Terminal arrangement:<br>a) High voltage b) Low voltage c) Neutral (LV) d) HV terminal phase spacing e) LV terminal phase spacing f) Any other information | | |
| 32 | Approximate masses<br>a)Core<br>b) Winding<br>c) Tanks, fittings and accessories. d)Oil<br>e)Total mass | <br>Kg<br>Kg<br>Kg<br>Kg | |
| 33 | Approximate quantity of oil required for filling (main tank) OLTC Overall maximum dimensions of the Transformer complete with accessories<br>a) Length<br>b) Breadth<br>c) Height | | |
| 34 | Dispatch details<br>a) Approximate mass of heaviest package<br>b) Approximate dimensions of largest package<br>i) Length<br>ii) Breadth<br>iii) Height | <br>Kg<br><br>mm<br>mm<br>mm | |
| 35 | Untanking height Reference standards | | |
| 36 | Details of HV Bushings line (HV line end)<br>a) Voltage class<br>b)Current rating<br>c)1.2/50 µs impulse withstand<br>d)Make<br>e)Type<br>f)Creepage distance, total<br>g)Creepage distance, protected.<br>h)Year of manufacture.<br>i)Qty. of oil in oil filled bushing | | |
| 37 | Details of LV Bushings line (LV line end)<br>a)Voltage class<br>b)Current rating<br>c)1.2/50 µs impulse withstand<br>d)Make<br>e)Type<br>f)Creepage distance<br>g)Creepage distance<br>h)Year of manufacture<br>i)Qty. of oil in oil filled bushing | | |

| | | | | |
|---|---|---|---|---|
| | 38 | Details of Neutral Bushings<br>a)Voltage class,<br>b)Current rating,<br>c)1.2/50 µs impulse withstand<br>d)Make<br>e)Type<br>f)Creepage distance<br>g)Creepage distance<br>h)Year of manufacture.<br>i)Qty. of oil in oil filled bushing | | |
| | 39 | Details of Core Grounding Bushings<br>a)Voltage class,<br>b)Current rating,<br>c)1.2/50 µs impulse withstand d)Make<br>e)Type<br>f)Creepage distance<br>g)Creepage distance<br>h)Year of manufacture.<br>i)Qty. of oil in oil filled bushing | | |
| | 40 | Details of LV Cable Connection<br>a)Clearances<br>i)Phase to Phase<br>ii)Phase to Earth<br>b)Drawing enclosed<br>c)Length of Each phase Bus Bars<br>d) The Bus bars are suitable for how many numbers of 1Cx 1000 sq mm, 11 kV, XLPE cable. | | |
| | 41 | Details of HV Cable Connection<br>a)Clearances<br>i)Phase to Phase<br>ii)Phase to Earth<br>b)Drawing enclosed<br>c)Length of Each phase Bus Bars<br>d) The Bus bars are suitable for how many numbers of 3Cx 400 sq mm, 33 kV, XLPE cable. | | |
| | 42 | Designed Fault Levels<br>a) HV<br>b) LV | MVA | |
| | 43 | Core<br>a)Material & Grade<br>b)Type of core<br>c)Operating flux density<br>d)Maximum flux density<br>e)Over fluxing capability for ±10% voltage & ±3% frequency variation f)Specific No load loss for the grade of core chosen at the specified flux density Please submit copy of graph in support of this) | | |
| | 44 | Rail gauge (along both axis) | | |
| | 45 | List of routine tests to be carried out | | |

| | | | | |
|---|---|---|---|---|
| | 46 | List of other tests which will be carried out against extra price quoted elsewhere | | |
| | 47 | Overload capacity of transformer for 100% KNAN | | |
| | 48 | On load tap changer – Particulars<br>a)Make<br>b)Type, designation<br>c)Suitable for auto/manual operation<br>d)Rated voltage kV<br>e)Basic insulation level (BIL) of OLTC (kV peak)<br>f)One minute power frequency voltage withstand of OLTC g)Rated current (A)<br>h)No. of steps<br>i)Step voltage (V)<br>j) Rated voltage of drive motor – V<br>k)Whether diverter and selector chambers are separate.<br>l)Rated voltage of control circuit – V<br>m)Time to complete tap changing operation from any one step to next higher or lower tap.<br>i)On auto operation -Sec.<br>ii)On manual operation through push button - Sec.<br>n)List of routine tests to be carried out on tap changer<br>o)Location of the taps with respect to the terminals of the tapped winding<br>p)Drawing or pamphlet number of the technical and descriptive particulars the OLTC, enclosed with the bid.<br>q)Separate conservator and Buchhloz relay provided for OLTC (Yes/No)<br>r)RTCC (Remote Tap Changer Control Panel)<br>i. List of tap changer Annunciation ii. Two sets of potential free contacts for Scada provided. iii. Two sets of 0/20 mA output for tap position indication provided. iv. 415 V Autochangeover facility for OLTC motor provided. | | |
| | 49 | Marshalling Box<br>a) Derived control supply Voltage<br>b) 415 V /control supply auto-changeover facility provided.<br>c) Local OTI/WIT provided.<br>d) Remote OTI/WIT provided.<br>e)Two sets of 0/4-20 mA signals for OTI/WIT provided.<br>f)List of annunciations.<br>g)Two sets of potential free contacts for annunciations provided | | |
| | 50 | Whether Marshalling boxes (ground as well as tank) provided as per specifications i.e | | |
| | 51 | Surface Preparation/Painting | | |

| | | | | |
|---|---|---|---|---|
| | | 1) Adequate rust proofing done on transformer<br>2) Adequate rust proofing done on radiators (Details of measures to be enclosed)<br>3) Type of paint (epoxy/enamel)<br>4) Whether galvanized radiation offered as alternative | | |
| | 52 | Conservator Oil preservation system Details (Air bag)<br>a) Material of separator/Air bag<br>b) Details of air pressure for the separator<br>i. Design pressure<br>ii. Working pressure<br>iii. Bursting pressure (Puncture strength)<br>c) Procedure of oil filling with air bag to be enclosed.<br>d) Any precautions to be taken during maintenance of transformer with air bag to be mentioned. | | |
| | 53 | List of utilities to whom bidder has supplied Transformers of similar rating specifically indicating year of supply and year of commissioning of these transformers | | |
| | 54 | General arrangement drawing of the transformer indicating details of HV/MV/LV terminals and over all dimensions enclosed | Yes / No | |
| | 55 | Type test reports of similar transformers enclosed | Yes / No | |
| | 56 | Neutral Bushing Calculation to be submit | Yes | |

## 20.0 SCHEDULE OF DEVIATIONS

**(TO BE ENCLOSED WITH THE BID)**

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

| SR.No. | Clause No. | Details of deviation with justifications |
|---|---|---|
| | | |

We confirm that there are no deviations apart from those detailed above.

Seal of the Company:

Signature

Designation

## ANNEXURE-I

### A) INSPECTION TEST PLAN FOR STAGE INSPECTION-I OF POWER TRANSFORMER

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

**a) 100% quantity of core and coil shall be ready for inspection.**
**b) 100% Quantity of Tank and its mountings i.e Marshalling box, conservator etc. 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.

| S No. | Particulars | As offered | As observed | Deviation and Remarks |
|---|---|---|---|---|
| (A) | Inspection of Core : | | | |
| | (I) Core Material | | | |
| | 1) Manufacturer's characteristic certificate in respect of grade of lamination used. (Please furnish test certificate) | | | |
| | 2) Thickness of core lamination | | | |
| | 3) Remarks regarding Rusting and smoothness of core. | | | |
| | (II) Core Construction : | | | |
| | (1) Core Diameter (mm) | | | |
| | (2) Total cross sectional area of core | | | |
| | (3) Effective cross sectional area of core | | | |
| | (4) Whether top yoke is cut for LV connection. | | | |
| | (5) If yes, at 4 above, whether Reinforcement is done. | | | |
| | (6) Core length (leg center to leg center) | | | |
| | (7) Window height. | | | |
| | (8) Core height | | | |
| | (9) Core weight only | | | |
| | (10) Loss measurement in one random stamping | | | |
| | (11) Loss measurement in assembled core only | | | |
| | (12) Core earthing provision with copper trip | | | |

| | | | | |
|---|---|---|---|---|
| | (13) Core marking plate on clamping arrangement | | | |
| | (14) The insulation between core and bolts, core and clamps shall withstand **2.5 kV for one minute** | | | |
| (B) | INSPECTION OF WINDING | | | |
| | (I) Winding material | | | |
| | (1) Material used for | | | |
| | a) HV winding | | | |
| | b) LV winding | | | |
| | (2) Grade of material for | | | |
| | a) HV winding | | | |
| | b) LV winding | | | |
| | (3) Test certificate of manufacturer (enclosed copy) for winding material of: | | | |
| | a) HV | | | |
| | b) LV | | | |
| | (II) Construction Details | | | |
| | 1) Size of Cross sectional area of conductor for : | | | |
| | a) HV winding | | | |
| | a) LV winding | | | |
| | 2) Type of insulation for conductor of : | | | |
| | a) HV winding | | | |
| | b) LV winding | | | |
| | 3) Diameter of coils in: | | | |
| | a) LV winding | | | |
| | a) Internal Diameter (mm) | | | |
| | ii) Outer diameter (mm) | | | |
| | b) HV winding | | | |
| | a) Internal diameter (mm) | | | |
| | ii) Outer diameter (mm) | | | |
| | 4) Current density of winding material used for: | | | |
| | a) HV | | | |
| | b) LV | | | |
| | 5) Total No. of turns | | | |
| | a) HV coils | | | |
| | b) LV coils | | | |
| | 6) Total weight of coils of | | | |
| | a) LV winding (Kg) | | | |
| | b) HV winding (Kg) | | | |
| (C) | INSULATION MATERIALS | | | |

| | | | | |
|---|---|---|---|---|
| | (I) DPC/TPC Paper Insulation | | | |
| | a) Type of Paper (Dotted Kraft or Diamond Dotted Kraft) | | | |
| | b) Make | | | |
| | c) Thickness (mm) | | | |
| | d) DPC laying direction | | | |
| | e) Percentage Overlapping | | | |
| | II) Interlayer Insulation | | | |
| | a) Type of Paper | | | |
| | b) Make | | | |
| | c) Thickness (mm) | | | |
| | III) Between HV and LV winding | | | |
| | a) Type of Paper | | | |
| | i. Make | | | |
| | ii. Thickness (mm) (all size) | | | |
| | b) Type of Pressboards | | | |
| | i. Make | | | |
| | ii. Thickness (mm) (all size) | | | |
| | IV) Between core and LV | | | |
| | Type of Paper | | | |
| | i. Make | | | |
| | ii. Thickness (mm) (all size) | | | |
| | Type of Pressboards | | | |
| | i. Make | | | |
| | ii. Thickness (mm) (all size) | | | |
| | V) Material used for top and bottom yoke insulation | | | |
| | a) Type of Material | | | |
| | i. Make | | | |
| | ii. Thickness (mm) (all size) | | | |
| | iii. Test certificate to be reviewed for electrical and mechanical properties | | | |
| | VI) Material used for Spanner, wedge and Axial for insulation | | | |
| | a) Type of Material | | | |
| | i. Make | | | |
| | ii. Thickness (mm) (all size) | | | |
| | iii. Visual condition( i.e. free from dust, burr, damage and sharp edges) | | | |
| | VII) Test certificate of manufacturer (enclose copy for all type of papers, pressboard and other material used) | | | |
| (D) | TANK : | | | |
| | (I) Construction Details: | | | |

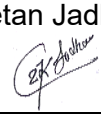
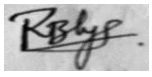
| | | | | |
|---|---|---|---|---|
| | 1) Shape | | | |
| | 2) Thickness of side wall (mm) | | | |
| | 3) Thickness of top and bottom plate (mm) | | | |
| | 4) Provision of sloping top cover | | | |
| | 5) Tank internal dimensions (mm) | | | |
| | a) Length X Width | | | |
| | b) Height | | | |
| | (II) General Details : | | | |
| | 1) Inside painted by oil corrosion resistant paint (please specify which type of coating done) | | | |
| | 2) Provision of lifting lugs. | | | |
| | a) Numbers | | | |
| | b) Reinforcement done by welding all side of Lug.<br><br>c) Lifting lug DP test on welding.<br><br>d) The welding thickness measurement with fillet gauge at both side of lifting lug. | | | |
| | 3) Provision of air release plug | | | |
| | 4) Provision of hot dip galvanized (HDG) GI Nuts Bolts with 1no. plain and 1no. spring washer. | | | |
| | 5) Deformation of side wall of tank when subject to: | | | |
| | a) Vacuum of (-) 0.7 Kg/sq.cm for 30 minutes. | | | |
| | b) Pressure of 0.8 Kg/sq.cm. for 30 minutes. | | | |
| | (III) Other Dimensions : | | | |
| | a. Conservator (Length X Dia ) | | | |
| | b. OLTC Box Dimension ( L X W X H) | | | |
| | c. Other Mountings location and dimensions as per approved Cat-A/ Specification | | | |
| (E) | TERMINALS: | | | |
| | 1) Material whether of Brass Rods | | | |
| | a) HV | | | |
| | b) LV | | | |
| | 2) Size (dia. In mm ) | | | |
| | a) HV | | | |

| | | | | |
|---|---|---|---|---|
| | b) LV | | | |
| (F) | BUSHINGS – Two part | | | |
| | 1) Whether HV & LV bushings mounted as per drawing. | | | |
| | a) HV- Top Inclined (as per drawing) | | | |
| | b) LV – Side | | | |
| | 2) Bushing Clearance: (mm) | | | |
| | a) LV to Earth | | | |
| | b) HV to Earth | | | |
| | c) HV-LV | | | |
| | d) LV-LV | | | |
| | 3) Bushing are two part and inner part shall be sealed and external part is replaceable without affecting sealing and need of opening of top cover. | | | |
| (G) | TANK BASE: | | | |
| | 1) Whether tank base is as per approved Cat-A drawing | | | |
| (H) | OIL: | | | |
| | 1) Name of supplier | | | |
| | 2) Breakdown voltage of oil: (kV) | | | |
| | a) Filled in tanked transformer | | | |
| | b) In storage tank (to be tested by Inspecting officer). | | | |
| | 3) Supplier's test certificate (enclose copy) | | | |
| (I) | ENGRAVING: | | | |
| | 1) Engraving of Sl. No. and name of firm and YoM. | | | |
| | a) On bottom of clamping channel of core-coil assembly. | | | |
| | b) On Body of tank | | | |
| (J) | NAME PLATE DETAILS: | | | |
| | Whether Name Plate is as per approved drawing | | | |
| (K) | COLOUR OF TRANSFORMER | | | |
| | 1) Tank body (Inner side) | | | |
| | 2) Tank body (Outer side) | | | |

**BA REPRESENTATIVE** **INSPECTING OFFICER**

| Rev No. | Prepared By & Date | Checked By & Date | Approved for Issue By & Date |
|---|---|---|---|
| R00 | Ketan Jadhav | Ajay V. Potdar | Ravindra M. Bhanage |
| | 05/02/24 | 05/02/24 | 05/02/24 |

**DATE OF INSPECTION**

| Rev No. | Prepared By & Date | Checked By & Date | Approved for Issue By & Date |
|---|---|---|---|
| R00 | Ketan Jadhav  | Ajay V. Potdar  | Ravindra M. Bhanage  |
| | 05/02/24 | 05/02/24 | 05/02/24 |

## B) INSPECTION TEST PLAN FOR STAGE INSPECTION- II OF POWER TRANSFORMER

Note: i) The stage inspection-II shall be carried out in case:-
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 10 days from the date of issuance of clearance for stage inspection, otherwise stage inspection already cleared shall be liable for cancellation.

| Sr no | Name of test | Specified value(Range) | Reference documents | Test Result | Pass/Fail |
|---|---|---|---|---|---|
| 1 | Visual inspection for material used, it's finish and workmanship | Free from cracks, nicks, protrusion and other visible defects. | TATA POWER-Specifications | | |
| 2 | Physical Verification of complete CCA with all fittings including insulation used, packing used, Bus bars, Flats, Channels etc. | GTP Values | GTP/TATA POWER-Specifications/Approved drawing | | |
| 3 | Clearances and Dimension measurements. | GTP Values | GTP/TATA POWER-Specifications/Approved drawing | | |
| 4 | Physical Verification Leads positions | GTP Values | GTP/TATA POWER-Specifications/Approved drawing | | |
| 5 | Ratio Measurement at all Taps | GTP Values | IS : 2026-2011 (Part I) cl. 10.3 | | |
| 6 | Magnetic Balance Test | GTP Values | CBIP Pub.317 Cl.B.6 | | |
| 7 | 2KV/Isolation Test for one minute | Should Withstand | | | |

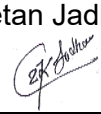
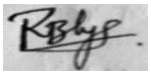
**BA REPRESENTATIVE** **INSPECTING OFFICER**

**DATE OF INSPECTION**

| Rev No. | Prepared By & Date | Checked By & Date | Approved for Issue By & Date |
|---|---|---|---|
| R00 | Ketan Jadhav | Ajay V. Potdar | Ravindra M. Bhanage |
| | 05/02/24 | 05/02/24 | 05/02/24 |

## ANNEXURE-II
## Inspection Test Plan for Power Transformers

| 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. | TATA POWER specification | | |
| 2 | Physical Verification of complete Transformer with all assembly including test rollers, radiators, cable boxes etc. and Checking of weights, Dimensions. | GTP Values | TATA POWER specification | | |
| 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/TATA POWER-Specification | IS : 2026 (Part III)-2009 | | |
| 10 | Test on ON-Load Tap Changer | GTP Values/TATA POWER-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 | TATA POWER-Specification | | |
| 13 | Bushing shall be tested for Capacitance and Power factor and shall meet the manufacture's requirement. | GTP / TATA POWER-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 / TATA POWER-Specification | TATA POWER-Specification | | |
| 15 | Determination of Capacitances and dissipation factor winding-to-earth and between windings. | GTP / TATA POWER-Specification | IS : 2026 (Part I) cl.10.1.3 | | |

| Rev No. | Prepared By & Date | Checked By & Date | Approved for Issue By & Date |
|---|---|---|---|
| R00 | Ketan Jadhav  | Ajay V. Potdar  | Ravindra M. Bhanage  |
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| | | | | | |
|---|---|---|---|---|---|
| 16 | Magnetic balance test | GTP / TATA POWER-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 / TATA POWER-Specification | TATA POWER-specification | | |
| 19 | Measurement of Acoustic Noise Level | GTP / TATA POWER-Specification | TATA POWER-specification | | |
| 20 | Measurement of the power taken by the fans | GTP / TATA POWER-Specification | TATA POWER-specification | | |
| 21 | Functional tests on auxiliary equipment:<br>i. Test on OTI and WTI<br>ii. High Voltage test on insulation test for Auxiliary Wiring. | GTP / TATA POWER-Specification | TATA POWER-specification | | |
| 22 | Test on Oil filled in Transformer<br>i. Dielectric Strength of Oil<br>ii. Water Content.<br>iii. Dielectric Dissipation factor (tan delta at 90° C.<br>iv. Resistivity | GTP / TATA POWER-Specification | TATA POWER-specification | | |
| 23 | Temperature rise test | GTP / TATA POWER-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 | TATA POWER-specification | | |
| 26 | Lightning Impulse voltage test with chopped wave. | GTP / TATA POWER-Specification | IS : 2026 (Part III) cl. 13 | | |

**BA REPRESENTATIVE** **INSPECTING OFFICER**

**DATE OF INSPECTION**

# ANNEXURE – III

## 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 | CTs | | | |
| 13 | WTI | | | |
| 14 | OTI | | | |

# TECHNICAL SPECIFICATION

## Nitrogen Injection Fire Protection System (NIFPS)

| Rev No. | Prepared By & Date | Checked By & Date | Approved for Issue By & Date |
|---|---|---|---|
| R00 | Ketan Jadhav | Ajay V. Potdar | Ravindra M. Bhanage |
| | 05/02/24 | 05/02/24 | 05/02/24 |

## TECHNICAL SPECIFICATION COVER SHEET

**Document No: ENSE-DS-2035-R00**

**Document Title: Technical Specification of Nitrogen Injection Fire Protection System (NIFPS)**

| | | | | | | | | | |
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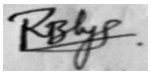
| R0 | **ENSE-DS-2035-R00** | 05/02/24 | | KJ |  | AVP |  | RMB |  |
| **Rev No.** | **Remarks** | **Date** | | **Initials** | **Sign** | **Initials** | **Sign** | **Initials** | **Sign** |
| | | | | **Prepared By** | | **Reviewed By** | | **Approved & Issued By** | |

| Rev No. | Prepared By & Date | Checked By & Date | Approved for Issue By & Date |
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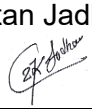
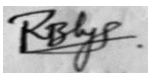
| R00 | Ketan Jadhav  | Ajay V. Potdar  | Ravindra M. Bhanage  |
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## CONTENTS

## 1 SCOPE

This specification covers design, engineering, manufacture, shop testing, inspection, painting, packing, supply, installation, testing & commissioning of Nitrogen Injection Fire Protection System (NIFPS) complete with all accessories for efficient and trouble-free operation of the distribution network of Tata Power Company Ltd. at Mumbai.

It is not the intent to specify completely herein all details of the equipment; nevertheless, the equipment shall be complete and operative in all respects and shall conform to the highest standard of engineering, design and workmanship of International Standards. The scope also covers installation & commissioning of Nitrogen injection fire protection system.

## 2 APPLICABLE STANDARDS

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions and their latest amendment of the following Indian, International standards and shall conform to the regulations of the local authorities.

| Sr. No. | Standards | Description |
|---|---|---|
| 1 | IEC 60529: 2001 | Degrees of protection provided by enclosures (IP Code) |
| 2 | IS 7825: 2004 | Cylinder Type Hand Lawn Mower Specification |
| 3 | IS 3224: 2002 | Valve for compressed gas cylinders excluding liquefied petroleum gas (LPG) cylinders |

## 3 CLIMATIC CONDITIONS OF THE INSTALLATION

| | | |
|---|---|---|
| 1 | Maximum ambient temperature | 43 deg.C |
| 2 | Max. Daily average ambient temp | 35 deg.C |
| 3 | Min Ambient Temperature | 07 deg.C |
| 4 | Maximum Relative Humidity | 100% |
| 5 | Minimum Relative Humidity | 40% |
| 6 | Average No. of thunderstorm per annum | 50 |
| 7 | Average Annual Rainfall | 2380mm |
| 8 | Average No. of rainy days per annum | 115 |
| 9 | Rainy months | June to Oct. |
| 10 | Altitude above MSL not exceeding | 300 meters |
| 11 | Average Air Pressure | 29.6-inch Hg |

Atmosphere is generally laden with mild acid and dust suspended during summer months and subjected to fog in winter months. The design of the equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1g.

## 4.0 General Construction

4.1. NIFPS 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. All the hardware's used in the system shall be stainless steel. It shall ensure that fire prevention and extinguishing system installed is fool proof and reliable. It shall ensure that fire prevention and extinguishing system shall not affect the normal operation of power transformer. NIFPS shall be retrofitted into the existing Power transformers installed in Tata Power network.

4.2. NIFPS shall mainly consist of

a) Fire Cubicle - Fire extinguishing cubicle (preferably Rittal make) 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.

b) Nitrogen Cylinder - It Shall be as per IS-7285, certified by the Bureau of Indian Standards (ISI) and approved by the Chief Controller of Explosives, Government of India .along with neck ring, valve with valve guard as per IS 3224. Gross weight of the cylinder should be 76 kg minimum. Weight of empty cylinder should be 58 kg minimum. Pressure at which N2 will be released should be 10Kg/Cm2. Normal range of pressure should be 150Kg/Cm2. Maximum allowable cylinder pressure should be 200 kgf/cm2 at 150C. Hydrostatic test pressure should be 250 kgf/ cm2. Purity (PPM) should be 99%. Volume of Cylinder is to be 68 ltr. Water capacity, 10.2 cubic meters. Provision shall be available so that in case of accidental leakage of Nitrogen, the same should not affect the operation of Transformer.

**c) Portable oil drain pit (1500 Litres) – A portable oil drain pit of suitable capacity for 20 MVA Power Transformer shall be provided with each Transformer. Oil drain pipe extension of suitable sizes for connecting pipes to oil pit to be provided.**

4.3. Fire Extension period : Fire extinction period on commencement of nitrogen injection should be limited to maximum of 30 seconds. On system activation up to post cooling should be limited to maximum of 30 minutes.

4.4. Fire detectors: Fire detector provided on the transformer shall take minimum time for detection of fire and initiate the fire protection system on receipt other required signals. Heat sensing shall be provided as fire detector.

4.5. Valve: 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. All valves used in system shall preferably be stainless steel ball / butterfly type. Limit switches shall be provided wherever required along with neck ring, valve with valve guard as per IS 3224.

4.6. Power Source: System shall operate on station DC auxiliary supply (220 VDC). The DC Voltage will be varied with station to station. The system shall be capable of working in Auto/Remote Electrical/Local manual modes. Provision shall be available to keep the system “ISOLATED” /”OUT OF SERVICE” which is necessary for preventing any mal-operation during transformer maintenance.

4.7. Cables: 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. Control cable gland shall be used.

4.8. Pipe: The Pipeline used for the system shall be of Class ‘C’ type.

4.9. Protection philosophy: The protection system shall be compatible to be hooked on to the SCADA or fire alarm system. Suitably spare contacts shall be made available for operation of fire system. System using microprocessor micro controller shall be used.

4.10. Fire protection system:

Fire protection system shall operate in Auto mode under two logic:
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 Buccholz relay and electrical isolation of transformer through master trip relay or HV & LV circuit breaker in series to avoid any mal-operation of system.
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 Buccholz 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.
Provision shall be made in system so that any of the above two logic can be disabled by operator from local panel only.

4.11. 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.

The Local manual operating system shall be used only in case if the system fails in Auto mode/ Remote electrical mode/ power failure.

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.

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

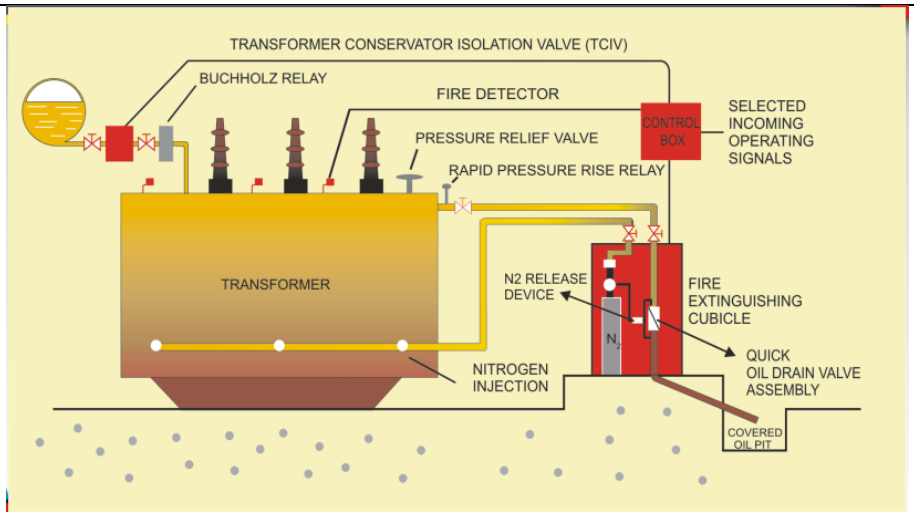
a) Open /Close status of valves.
b) Healthiness of all sensors.
c) Operation of PRV
d) Healthiness of control cable
e) Healthiness of control supply

4.13. Provision shall be for annunciation (along with audible alarm) of the following.

Detection of fire due to external causes
Low nitrogen pressure.
System initiated
Tank pressure beyond the set limit
Operating signal cable faulty.
Operation of conservator isolation valve (PNRV)
Supply failure.
Built-in-on-line testing facility:

4.14. The system shall have built-in-on-line testing facility, which will be operable without affecting the functioning of the transformer. Lifting magnet supervision test for oil drain & nitrogen injection to be included.

4.15. Schematic representation of NIFPS

| | | |
|---|---|---|
| | |  |
| **5.0** | **NAME PLATE AND MARKING:** | **5.1 RATING PLATE:**<br>A stainless-steel rating plate, of at least 1 mm thickness, shall be fitted on front side in a visible position.<br>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 TATA POWER”.<br><br>The name plate shall contain following information:<br><br>a) Manufacturer’s Name<br>d) Manufacturer’s Serial No.<br>e) Year of Manufacture<br>g) PO no & Guarantee clause. |
| **6.0** | **TESTS** | **TEST FOR NIFPS**<br><br>NIFPS shall be subjected to operational test at manufacturing works in presence of purchaser’s representative. The manufacturer’s test certificate of various accessories shall be furnished at the time of inspection to the inspecting officer.<br><br>**Routine/Acceptance Testing**:<br><br>Functional tests associated with following:<br>• Fire Extinguishing Cubicle<br>• Control Panel<br>• Fire Detector<br>• Transformer Conservator Isolation Valve<br>• Complete system. |
| **7.0** | **TYPE TEST CERTIFICATES** | The Bidder shall furnish the type test certificates of all type test conducted as per relevant IS/IEC standards in respect of various brought out items including test reports for degree of protection for FEC, Control Panel, Signal Box, TCIV, Fire detector. |

| | | |
|---|---|---|
| 8.0 | PRE-DESPATCH INSPECTION | The Material shall be subject to inspection by a duly authorized representative of the TATA POWER COMPANY. Inspection may be made at any stage of manufacture at the discretion of the Purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall always grant free access to the places of manufacture to TATA POWER COMPANY `s representatives when the work is in progress. Inspection by the TATA POWER COMPANY or its authorized representatives shall not relieve the Bidder of his obligation of furnishing equipment in accordance with the specifications. TATA POWER COMPANY authorized representatives shall have the right to inspect the design, materials and workmanship and to report thereon, at any stage of manufacture, if found necessary. All facilities shall be extended to our representatives for witnessing the tests. Due notice shall be given to us to enable us to depute our representatives for stage inspection.<br>Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TATA POWER COMPANY.<br><br>Following documents shall be sent along with material<br><br>a) Test reports<br>b) MDCC issued by TATA POWER COMPANY<br>c) Invoice in duplicate<br>d) Packing list<br>e) Drawings & catalogue<br>f) Delivery Challan<br>g) Other Documents (as applicable). |
| 9.0 | INSPECTION AFTER RECEIPT AT STORES | The material received at TPC, Mumbai store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection or any other parameters observed after delivery.<br><br>Bidders to attend and rectify the same at his own cost. The material shall be accepted in stores only after rectification of any observed flaw. The delay in rectification shall lead to any contractual penalty.<br><br>Billing shall be processed only after acceptance of the material. |
| 10 | GUARANTEE | Bidder shall stand guarantee towards design, materials, workmanship & quality of process / manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract.<br><br>In the event any defect is found by the TATA POWER COMPANY up to a period of at least 48 months from the date of commissioning or 60 months from the date of last supplies made under the contract whichever is later, (the time scale of 48/60 months could be enhanced subject to mutual agreements) Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Purchaser, failing which the TATA POWER COMPANY 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.<br><br>In case of GP failure, BA shall report at site within 48 hours from intimation and arrange for rectification of fault within a mutually agreed time. In case rectification at site is not possible then alternative arrangement (replacement) to be made by BA within 15 days of intimation of failure. |

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| R00 | Ketan Jadhav | Ajay V. Potdar | Ravindra M. Bhanage |
| | 05/02/24 | 05/02/24 | 05/02/24 |

| | | |
|---|---|---|
| | | 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. |
| 11 | PACKING | Bidder shall ensure that the item covered under this specification shall be packaged for rail/road transport in a manner so as to protect the equipment from damage in transit.<br><br>1) Packing protection- Against shocks, vibration & corrosion, damages during transportation<br>2) Packing identification labels, to show purchaser name, PO number, quantity of panels, Panel type, Manufacturer serial number<br>3) Handling instruction- To be marked on packing boxes.<br>4) Bidders should prefer to use recyclable & environmentally friendly materials for packing.<br>5) No single use plastic to be used.<br>6) Packing should be done with environment friendly recyclable materials. |
| 12 | QUALITY CONTROL | 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. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished.<br><br>TATA POWER COMPANY shall reserve the sole rights for the type test of a random sample from the lot and in case of any discrepancy or deviation from the Type test certificates submitted along with the Bid; the complete Lot shall be rejected.<br><br>TATA POWER COMPANY representative or its nominated representative shall have free access to the Bidder's works to carry out inspections.<br><br>If anything missing in QAP and required as per other clauses of this document, bidder is liable to perform the same without cost implication. |
| 13 | MINIMUM TESTING FACILITIES | Bidder shall have adequate in-house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards and as specified above. |
| 14 | MANUFACTURING ACTIVITIES | The successful bidder will have to submit first GTP & Drawing with 7 days from placement of outline agreement for approval and complete the approval process within 14 days of outline agreement. The date of Code -2/ Code-1 approval given by TATA Power will be treated as first day for assessment of LD (if applicable). |
| 15 | SPARES, ACCESSORIES AND TOOLS | Bidder shall provide a list of recommended spares with quantity and unit prices for 5 years of operation after commissioning. 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. The Purchaser may order additional spares at any time during the contract period at the rates stated in the Contract Document.<br><br>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. 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. |

| | | |
|---|---|---|
| | | 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. |
| 16 | **DRAWINGS AND DOCUMENTS** | Following drawings and documents shall be prepared based on Purchaser's specifications and statutory<br>requirements and shall be submitted with the bid:<br>a) Completely filled in Technical Particulars<br>b) General description of the equipment and all components including brochures.<br>c) General arrangement drawing<br>d) Foundation plan<br>e) Bill of material<br><br>All the documents & drawings shall be in English language. Soft copied of installation and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices shall be provided by bidder. |

**17 GUARANTEED TECHNICAL PARTICULARS**

| Sl No. | Description | Tata Power Requirements |
|---|---|---|
| 1 | General | |
| 1.1 | Manufacture | |
| 1.2 | Reference Standard | |
| 2 | Fire Extinguishing Cubicle | |
| 2.1 | Dimensions | Bidder to provide |
| 2.2 | Weight | 450 Kg (maximum) |
| 2.3 | Type and thickness of sheet steel | CRCA - 3 mm thick |
| 2.4 | Capacity of Nitrogen Cylinder | 10 Cubic Meter 150 kg/sq.cm. Pressure |
| 2.5 | Weight of empty cylinder | Bidder to provide |
| 2.6 | Pressure of Nitrogen Filling | 150 Kg/cm2 |
| 2.7 | Pressure at which nitrogen will be released | 10 Kg/cm2 |
| 2.8 | Normal range of pressure | 150 Kg/cm2 |
| 2.9 | Hydrostatic test pressure | 200 Kg/cm2 |
| 2.10 | Nitrogen gas purity (PPM) | 99% |
| 2.11 | Volume of cylinder (water and gas) | 68 Litres of water capacity, 10 $m^3$ gas |
| 2.12 | Minimum distance of FE cubicle from transformer | Bidder to provide |

| | | |
|---|---|---|
| 2.13 | Method of mounting | Floor Mounting |
| 2.14 | Make type and other details in respect of following | |
| | a) Manometer | Bidder to provide |
| | b) Pressure Regulator | Bidder to provide |
| | c) Oil release unit | Bidder to provide |
| | d) Gas release unit | Bidder to provide |
| | e) Oil drain assembly | Bidder to provide |
| | f) Pressure/Limit switches | Bidder to provide |
| | g) No of contacts and spare contacts (NO & NC) | Bidder to provide |
| | h) Cubicle heater and thermostat | Bidder to provide |
| | i) Control cable gland | Bidder to provide |
| 2.15 | IP class | IP 55 |
| | Oil drain valve and Depressurization valve (above FEC) | |
| 3 | Make | Petson / Sunrise /Sarvoday / Equivalent |
| 3.1 | Type | Butterfly Valve |
| 3.2 | Size | 80 NB |
| 3.3 | Type of metal | Mild Steel |
| 3.4 | Location | |
| 4 | Nitrogen injection valve | |
| 4.1 | Make | Oswal/Neo/Atam/ Manixon / Equivalent |
| 4.2 | Type | Gun Metal, Lockable, stem rising |
| 4.3 | Size/material | 25 NB |
| 4.4. | Material | Gunmetal |
| 4.5 | Location | |
| 5 | Oil drain Pipe | |
| 5.1 | Size | 80 NB |
| 5.2 | Length | As per site requirement |
| 5.3 | Number of openings in the transformer tank | For oil drain 1 no & N2 injection 6 nos |
| 5.4 | Material / Class | Bidder to provide |
| 6 | Control box | |
| 6.1 | Dimensions (LXWXH) mm | Bidder to provide |
| 6.2 | Weight (Kg) | Bidder to provide |
| 6.3 | Type and thickness of sheet steel | CRCA,16/14 SWG |
| 6.4 | Details of component provided in CB | Bidder to provide |
| 6.5 | Method of mounting | Wall Mounting |

| | | |
|---|---|---|
| 6.6 | Whether audio & visual alarms provided | Bidder to provide |
| 6.7 | Control voltage | 220 V DC |
| 7 | Conservator isolation valve | |
| 7.1 | Make | Bidder to provide |
| 7.2 | Type | Bidder to provide |
| 7.3 | Location | Between conservator and buchholz relay |
| 7.4 | Whether suitable for pipe of size 80mm dia | YES |
| 7.5 | No of contacts and spare contacts (NO & NC) | Bidder to provide |
| 7.6 | Padlocking arrangement | YES |
| 8 | Linear Heat Detectors | |
| 8.1 | Make | Bidder to provide |
| 8.2 | Type | Quartz bulb |
| 8.3 | Qty required | Bidder to provide |
| 8.4 | Method of fixing | On transformer top with brackets |
| 8.5 | Effective heat sensing area | Upto radius of 800 mm |
| 8.6 | Temp recommended for effective heat | 141 |
| 9 | Signal Box | |
| 9.1 | Make | Bidder to provide |
| 9.2 | Type (IP class) | IP 55 |
| 9.3 | Location | As per site requirement |
| 9.4 | Method of mounting | Wall/Frame mounting |
| 10 | Cabling | |
| 10.1 | Make & Type | FRLS - RPG, SEPL,KEI, Ravin, Polycab, Finolex |
| 10.2 | No of cores and size | 12 core and 4 core 1.5 sqmm |
| 11 | Time of operation | |
| 11.1 | For fire activation | Max 100 ms |
| 11.2 | For reduction of pressure in the tank/for extinction of fire | Max 730 ms |
| 12 | Other Technical Details / Additional information | Bidder to provide |
| 12.1 | Availability of online supervision of required signals | Bidder to provide |
| 12.2 | Availability of DC supply monitoring scheme | Bidder to provide |

| | | |
|---|---|---|
| 12.3 | Availability of Test facility | Bidder to provide |
| 12.4 | built in facility for monitoring or display of the followings | |
| | Ø Open /Close status of valves. | Bidder to provide |
| | Ø Healthiness of all sensors. | Bidder to provide |
| | Ø Operation of PRV | Bidder to provide |
| | Ø Healthiness of control cable | Bidder to provide |
| | Ø Healthiness of control supply | Bidder to provide |
| 12.5 | Availability of annunciation (along with audible alarm) and a mimic panel of the following. | |
| | Ø Detection of fire due to external causes | Bidder to provide |
| | Ø Low nitrogen pressure. | Bidder to provide |
| | Ø System initiated | Bidder to provide |
| | Ø Tank pressure beyond the set limit | Bidder to provide |
| | Ø Operating signal cable faulty. | Bidder to provide |
| | Ø Operation of conservator isolation valve (PNRV) | Bidder to provide |
| | Ø Supply failure. | Bidder to provide |
| 12.6 | System is capable to extinguish Fire Both in Main Tank and OLTC Tank | Bidder to provide |
| 12.7 | capable of working in Auto/Remote Electrical/Local manual modes | Bidder to provide |
| 12.8 | Provision is available to keep the system “ISOLATED” /”OUT OF SERVICE” for preventing any mal-operation during transformer maintenance. | Bidder to provide |
| 12.9 | 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 is present | Bidder to provide |
| 12.1 | The Local manual operating system for a condition when system fails in Auto mode/ Remote electrical mode/ power failure is Available with suitable indication of same in control panel. | Bidder to provide |
| 12.11 | Provision is available so that in case of accidental leakage of Nitrogen, the same should not affect the operation of Transformer. | Bidder to provide |
| 12.12 | Provision is available to manually close the oil drain valve for isolating the system during installation and maintenance | Bidder to provide |

## 18 SCHEDULE OF DEVIATIONS

**(TO BE ENCLOSED WITH THE BID)**

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

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

We confirm that there are no deviations apart from those detailed above.

Seal of the Company:

Signature

Designation

The Tata Power Company Limited is hereunder referred to as the "Purchaser" or "Company". The person, firm or company selling the goods, the subject of this purchase order is referred to as "Vendor" or "Contractor". The subject of this purchase order is hereinafter referred to as the "Material(s)"or "Goods".

The Contract shall mean the contract as derived from the following:

1. Purchase Order (with 'Commercial Notes' and Annexures to the Purchase Order referred thereon)
2. Technical Specifications.
3. General Terms & Conditions

The documents including all reference document (s) and Annexures forming the Contract are to be read together as a whole and are to be taken as mutually explanatory.

**1. Price:**

Unless otherwise specifically stipulated, the price shall be firm and shall not be subject to escalation for any reason till the validity of this Contract.

Unless otherwise specifically stipulated, the price shall be inclusive of road/ rail worthy water-proof packing & forwarding charges up to effecting delivery at FOT/ FOR despatch point, GST and shall also be inclusive of inland freight, terminal taxes and entry taxes as leviable on the transportation or entry of goods into any local area limits pursuant to the Contact.

**2. Taxes and Duties:**

2.1 The Contract Price shall be inclusive of all taxes, duties, including but not limited to GST or any local taxes, levies imposed by State/Central/Local governments

2.2 Taxes as mentioned in the Contract Price or Price Schedule shall be paid to the contractor subject to the Contractor complying with all the statutory requirements and furnishing the relevant documents including error free invoices containing detailed break-up of the taxes

2.3 However the payment of GST or local levies shall be restricted to the total amount as indicated in the price schedule.

2.4 Any duties, levies or taxes not mentioned in Contract Price or Price Schedule but applicable as per any statute (s) shall be deemed to be included in the Contract price and shall be to the account of the Contractor.

2.5 Any statutory variation in duties, levies or taxes if applicable and specified in this Contract till the scheduled date for supply of Goods and limited to direct invoices of the Contractor shall be to the account of Purchaser. The Contractor shall have the obligation to provide the necessary documentary evidence / supporting by way of gazetted notifications etc. to prove the change in such levies or taxes between the due date of submission of the Bid and the scheduled date of supply of goods to claim the difference.

2.6 The Contractor shall pass on to the Purchaser all the benefits of either reduction in tax rates, exemptions, concessions, rebate, set off, credits etc. or introduction of new tax rates exemptions, concessions, rebate, set off, credits etc. pertaining to all taxes, duties, imposts, fees and levies in respect of the supplies of Goods or performance of obligations under the contract. This would specifically include reduction of tax rates as a result of statutory changes or judicial rulings.

2.7 Any other taxes, levies and duties not mentioned in Contract Price or Price Schedule but applicable as per any statute (s) or introduction (omission) of new taxes, levies and duties shall be deemed to be included in the Contract Price and shall be to the account of the Contractor.

2.8 For facilitating availment of a credit, set-off, rebate, drawback or like benefit available to the Purchaser, the Contractor will facilitate the Purchaser by providing the necessary documentary and/or procedural support. In any process of assessment or re-assessment, of taxes payable by the Purchaser. Wherever expressly agreed the purchaser would provide the statutory form 'C' to the seller for availing the concessional rate of Central sales tax.

2.9 The Contractor shall bear and pay all the costs, liabilities, levies, interest, penalties in respect of non-compliances of any legal requirements as per various statutory provisions. The contractor shall keep the owner indemnified at all times from any tax liability, interest, penalties or assessments that may be imposed by the statutory authorities for non-compliances or non-observation of any statutory requirements by the Contractor.

2.10 Purchaser shall pay the invoices to the Vendor after necessary deductions as prescribed under the applicable law, income – tax or other

deductions under the State Tax laws as may be applicable to the Contract.

**3 Packing details:**

Packing details: The material must be packed in suitable packing to suit the mode of transport and to ensure its safe receipt at point of delivery. Any damage to material noticed at the time of delivery at site, due to improper packing or any other reason whatsoever shall be the responsibility of the Vendor. Such damaged goods shall be replaced within 14 days from intimation from the Purchaser.

**4 Transportation and Unloading at Site:**

The Vendor shall deliver the Material(s) at site/ Stores as per the delivery address specified in the Purchase order. The unloading at delivery shall be organised by the Purchaser unless otherwise specified. The receipt of the material/ equipment is subject to inspection and rejection if Material(s) is found unsatisfactory or any of the clauses under this purchase order are violated.

**5 Insurance:**

Unless otherwise specified, Purchaser will be responsible to obtain transit insurance for the Material(s). The Vendor shall intimate the Order Manager (as mentioned in the Purchase Order) along with Invoice, packing list, the Railway Receipt/Truck or Lorry Receipt etc. immediately after the consignment is booked, at the e-mail id mentioned in the Purchase order.

**6 Payment Terms:**

100% payment shall be made within 60 days from the receipt and acceptance of the material at the Consignee Stores/ Site/ Location as per the Contractual terms and conditions herein.

**7 Bills and invoice:**

The tax invoices should contain the details to comply with the GST Law. The supplier shall:

i) Furnish (electronically) and communicate to the Owner, the details of Goods or Services supplied by the 10th of the month succeeding the said tax period,
ii) Upon discovery of any discrepancy, rectify it and shall pay the tax and interest thereof,
iii) Furnish the returns (electronically), for the inward and outward supplies of Goods and/or Services, before the specified dates as per the GST Law,
iv) Communicate the tax paid, credits etc. as and when credited.
v) The Invoice should clearly state the description of the goods, quantity, sale price, tax %, and tax amount;
vi) The Invoice should be signed by an Authorized Signatory.

Bills/Invoices in the name of The Tata Power Company Ltd. with packing lists in triplicate shall be forwarded along with the equipment.

Contractor to furnish GST Registration no. in all invoices as well as Purchaser's (Tata Power's) GST no.

**8 Transfer of Title and risk:**

The transfer of property and risk of Material(s) shall be deemed to take place as follows:

a. For delivery F.O.R. or F.O.T. despatch point: Transfer of property on handing over the Material(s) to the carrier against receipt of clean Railway Receipt/Truck or Lorry Receipt and such receipt having been handed over to Purchaser. However, the risk of loss shall pass to the Purchaser on delivery of goods at the specified destination.

b. In case the Material(s) are procured by the Vendor from sub-vendors on receipt of duly endorsed documents of title to the goods.

**9 Contract Performance Bank Guarantee (In case applicable):**

9.1 The Vendor shall within 15 days of issue of this Purchase Order furnish an unconditional irrevocable bank guarantee duly stamped and strictly as per the prescribed format of the Purchaser from any nationalized bank or any scheduled bank having a branch in Mumbai and approved by the Purchaser for a sum equivalent to 10% of the Total value of Order valid for a period not less than 6 months from the expiry of the Warranty period.

9.2 Irrespective of the performance demonstrated as part of the Factory Acceptance Tests Take-over tests / Performance Tests etc, the Purchaser may call for re-validation of performance of the system during the performance guarantee period by conducting fresh performance tests if in its opinion, the

system is not able to deliver the designed performances based on its operational performance results. If the equipment fails to prove the performance during such performance tests, the Purchaser may allow the Vendor to either rectify the system by addition / modification of equipment etc at the Vendor's costs & risk to restore the performance levels. Failure to rectify the system to achieve the designed performance levels may result in imposition of penalties including revocation of the Performance Bank Guarantee and forfeiture of the entire amount under the Performance Guarantee.

9.3 In case the Vendor fails to furnish the requisite Bank Guarantee as stipulated above, then the Company shall have the option to terminate the contract besides other contractual remedies.

**10 Price reduction:**

10.1 The Vendor agrees that time of supply of Material(s) is of prime importance.
If the Vendor fails to supply Material(s) before the respective scheduled / fixed date for supply. Company may without prejudice to any other right or remedy available to the Company: -

10.1.1 Recover from the Vendor ascertained and agreed, genuine pre-estimate liquidated damages, and not by way of penalty, a sum equivalent to 1% (of total value of order) per week or part thereof for each week's delay, beyond the scheduled supply date each subject to maximum of 10% of the total order value, even though the Company may accept delay in supply after the expiry of the scheduled supply date. The Company may, at its discretion, set off the aforesaid amounts from any other amounts owed by the Company to the Vendor or recover such amounts in other manner as may be permissible under applicable laws.

10.1.2 Arrange to get supply from elsewhere on account and at the sole risk of the Vendor, such decision of the Company being final and binding on the Vendor; or

10.1.3 Terminate the contract or a portion of supply of the supply work thereof, and if so desired, arrange for the supply in default by the Vendor to be attained from elsewhere at the sole risks and costs of the Vendor.

10.2 Liquidated damages for performance shortfall (if applicable) shall be specified in the Technical Specifications.

10.3 The Liquidated Damages referred in this clause 10 may be recovered by the Company from the Vendor as set off against any monies owed by the Company to the Vendor or in any other manner permissible under applicable laws.

**11 Warranties:**

11.1 Materials and Workmanship: Vendor shall fully warrant that all the stores, equipment and component supplied under the order shall be new and of first class quality according to the specifications and shall be free from defects (even concealed fault, deficiency in design, materials and workmanship).

11.2 Should any defects be noticed in design, material and/or workmanship within 12 months after the Material(s) or any portion thereof as the case may be have been commissioned or for 24 months from the date of delivery, whichever period concludes earlier. Purchaser shall inform Vendor and Vendor shall immediately on receipt of such intimation, depute their personnel within 7 days to investigate the causes of defects and arrange rectification/ replacement/modification of the defective equipment at site, without any cost to Purchaser within a reasonable period. If the Vendor fails to take proper corrective action to repair/replace defects satisfactorily within a reasonable period, Purchaser shall be free to take such corrective action as may be deemed necessary at Vendor's risk and cost after giving notice to the Vendor, including arranging supply of the Goods from elsewhere at the sole risk and cost of the Vendor.

11.3 In case defects are of such nature that equipment shall have to be taken to Vendor's work for rectification etc., Vendor shall take the equipment at his costs after giving necessary undertaking or security as may be required by Purchaser. After repair Vendor shall deliver the equipment at site on freight paid basis. Any taxes applicable in relation to this repair shall be to the Vendor's account. All risks in transit to and fro shall be borne by the Vendor.

11.4 Equipment or spare parts thereof replaced shall have further warranty for a period of 12 months from the date of acceptance.

**12 Quality, Testing, inspection, installation:**

12.1 All Material(s) supplied under this Contract shall be new and unused.

12.2 Wherever a specific Quality Assurance Plan is provided with the Request for Quotation (RFQ) or agreed as part of the commercial/ technical discussions, the same shall be binding on the Vendor.

12.3 The material shall be inspected

a. At consignee end by Purchaser.

b. At factory premise of the Vendor/ sub-vendor by Purchaser or third party duly nominated by Purchaser. The Vendor shall extend all necessary co-operation to Purchaser/ third party inspector carrying out the inspection. The Inspector(s) shall have the right to carry out the inspection or testing, which will include inspection and testing of the raw materials at manufacturers shop, at fabricators shop and at the time of actual despatch before and/or after completion of packing.

12.4 The Vendor will inform Purchaser at least eight (8) days in advance of the exact place, date and time of tendering the Material(s) for required inspection and provide free access to the Inspector(s) during normal working hours at Vendor's or his/ its sub-Suppliers works, and place at the disposal of the Inspector(s) all useful means for undertaking the Inspection, checking the results of tests performed, marking the Material(s), getting additional tests conducted and final stamping of the Material(s).

12.5 Even if the inspection and tests are fully carried out, the Vendor shall not be absolved from its responsibilities to ensure that the Material(s), raw materials, components and other inputs are supplied strictly to conform and comply with all the requirements of the Contract at all stages, whether during manufacture and fabrication, or at the time of Delivery as on arrival at site and after its erection or start up or consumption, and during the defect liability period. The inspections and tests are merely intended to prima facie satisfy Purchaser that the Material(s) and the parts and components comply with the requirements of the Contract.

12.6 *All costs associated with the inspection shall be included in cost of Material(s).*

12.7 Original material test certificate/ performance test certificate/ fitment certificate/ test reports etc. relevant/ applicable as per the specifications/ standards shall be dispatched along with the material supply failing which the material may be rejected.

**13 Rejection:**

13.1 Rejected goods shall be removed and replaced within 14 days of the date of communication of rejection.

13.2 Claim in respect of breakage/shortages in any cases shall be referred on the Vendor within ninety (90) days from the date of receipt of Goods by the Purchaser which shall be replaced/made good by the Vendor at his own cost. All risk of loss or damage to the material shall be upon the Vendor till it is delivered to the purchaser/consignee.

14 **General Indemnity:**

The Vendor shall indemnify and keep the Purchaser indemnified from and against any and all claims, costs, liabilities (financial), litigations, compensations, judgments, expenses or damages (including attorney's fees and other related expenses) arising out of any breach or alleged breach of any of the conditions of this Contract, performance of the obligations hereunder, or any representation or misrepresentation made by the Vendor or any third party with regard to the subject of this Contract.

15 **Indemnity against IPR:**

The equipment, system, drawings, and other materials that shall be supplied against the order will become the Purchaser's property. Without limitation of any liability of whatsoever nature, the Purchaser shall be indemnified and kept indemnified against any claim for infringement or breach of any of the statues, rules & regulations by the use of or sale of any article or material supplied by the Vendor. The indemnity shall include any infringement of patent, trade mark, design, copyright or other property rights whether in Country of Origin, or elsewhere resulting from the Vendor's design, manufacture, use, supply or re-supply & would also cover use or sale of any article or material supplied by the Vendor to the Purchaser under the Purchase Order. The Indemnity shall cover any claim/action taken by a third party either directly against the Purchaser or any claim/action made against the Vendor & where under the Purchaser is made liable. The

Indemnity shall be for losses, damages, and costs including litigation costs, attorney fees etc incurred by the Purchaser in relation to the Purchase Order.

**16 Latent Defects Liability period (if applicable):**

Notwithstanding the inspections, acceptance tests, quality checks etc carried out by the Vendor and witnessed/accepted by the Purchaser, the Vendor shall further warrant the equipment for any latent defects in its design, material or workmanship against the specifications set forth and shall make good any such defects by way of repair or replacement of the part or whole of the defective product at its own cost & risks as and when such latent defects are observed and intimated by the Purchaser and intimated to the Vendor within 36 months of completion of warranty period.

**17 Force Majeure:**

17.1 In the event of either party being rendered unable by force majeure to perform any obligation required to be performed by it under this Contract the relative obligation of the party affected by such force majeure shall, after notice under this articles be suspended for the period during which such cause lasts. The term 'Force Majeure' as employed herein shall mean acts of God, wars (declared or undeclared), riots or civil commotion, fire, floods, and acts and regulations of the Government of India or State Government or any of the statutory agencies. Both the party shall pay to the other party, the amount payable upon the date of the occurrence of such force majeure.

17.2 Upon the occurrence of such cause and upon its termination, the party alleging that it has been rendered unable as aforesaid, thereby shall notify the other party in writing immediately but not later than twenty four (24) hours of the alleged beginning and ending thereof giving full particulars and satisfactory evidence in support of the claims.

17.3 During the period, the obligations of the parties are suspended by force majeure, the contractor shall not be entitled to payment of any rate.

17.4 In the event of the force majeure conditions continuing or reasonably expected to continue for a period more than thirty (30) days, Purchaser shall have the option of terminating the contract by giving seven (7) days notice thereof to the contractor.

**18 Variation:**

Except for any provisions in this Purchase Order, any change /modification to the terms and conditions of this Order can be issued only by Purchaser or with the prior written approval from Purchaser.

**19 Termination**

19.1 The Contract shall be deemed to be terminated on completion of delivery of Material(s)

19.2 Termination of Default by Vendor:
Purchaser may terminate the contract at any time if the Vendor fails to carry out any of his obligations including timely delivery under this Contract. Prior to termination, the Vendor shall be advised in writing of the causes of unsatisfactory performance to be improved upon 15 days of the receipt of notice. In case, if the Vendor fails to bring about the improvement to the satisfaction of the Purchaser, then the order shall be terminated.

19.3 Without prejudice to the rights and remedies available to Purchaser, Purchaser may terminate the Contract or part thereof with immediate effect with written notice to the Vendor if,:

19.3.1 The Vendor becomes bankrupt or goes into liquidation.

19.3.2 The Vendor makes a general assignment for the benefit of creditors.

19.3.3 A receiver is appointed for any substantial property owned by the Vendor.

19.3.4 The Vendor has misrepresented to Purchaser, acting on which misrepresentation Purchaser has placed the Purchase Order on the Vendor.

The Vendor/ Contractor shall not be entitled to any further payment under the Contract if the Contract is terminated. If the order is terminated under clause 19.2 and 19.3, the Vendor shall not be entitled to any further payment, except that, if Purchaser completes the supply of Material(s) and the costs of completion are less than the Total Order value, the Purchaser shall pay Vendor an amount properly allocable to supply of Material(s) fully performed by Vendor prior to termination for which payment was not made to Vendor. In case, the cost of completion of Material(s) exceed the total Order value, the additional cost incurred by Purchaser for such completion shall be paid by the Vendor.

19.4 Purchaser shall be entitled to terminate the Contract at it's convenience, at any time by giving thirty (30) Days prior notice to the Contractor. Such notice of termination shall specify that termination is for Companies convenience and the date upon which such termination becomes effective. Upon receipt of such notice, the Contractor shall proceed as follows:

19.4.1 cease all further work, except for such work as may be necessary and instructed by the Company/ Company's representative for the purpose of protecting those parts of the supplies already manufactured;

19.4.2 stop all further sub-contracting or purchasing activity, and terminate Sub-contracts;

19.4.3 handover all Documents, equipment, materials and spares relating to the supply of goods prepared by the Contractor or procured from other sources up to the date of termination for which the Contractor has received payment equivalent to the value thereof; and

19.4.4 handover those parts of the supplies manufactured by the Contractor up to the date of termination.

Upon termination pursuant to clause 19.4, the Vendor shall be entitled to be paid the full value on the Material(s) delivered in accordance with the Contract.

19.5 The Contractor shall not be released from any of his obligations or liabilities accrued under the Contract on termination. For the avoidance of doubt, the termination of the Contract in accordance with this clause shall neither relieve the Contractor of his accrued obligations for Warranty or his accrued liability to pay (liquidated) damages for Delay nor shall entitle him to reduce the value of Performance Security.

**20 Sub letting and assignment:**

The contractor shall not without prior consent in writing of the Purchaser, sublet, transfer or assign the contract or any part thereof or interest therein or benefit or advantage thereof in any manner whatsoever, provided nevertheless that any such consent shall not relieve the contractor from any obligation, duty or responsibility under the contract.

21 **Dispute Resolution**:

Dispute or differences arising out or relating to this Order shall be resolved amicably by the parties. Failing such amicable resolution of dispute / differences either party may refer the matter to arbitration of a Sole Arbitrator to be appointed jointly by both the parties. The award of the Arbitrator shall be final, binding and conclusive on the parties. The venue for arbitration shall be Mumbai. The Arbitration proceedings will be governed and regulated by the provisions of Indian Arbitration and Conciliation Act, 1996 as amended from time to time and the rules framed there under.

**22 Governing laws**

This Contract shall be construed in accordance with and governed by the Laws of India without giving effect to any principle of conflict of law.

**23 Jurisdiction**

This Contract and the transaction contemplated herein shall be subject to the exclusive jurisdiction of the competent Courts in Mumbai only.

**24 Limitation of Liability**

Notwithstanding anything contained in the Contract, the Contractor's aggregate liability under this Contract shall be limited 100% of the Total order value. This shall however, exclude liability arising pursuant to clause 2.8- tax indemnity, clause 14- General Indemnity, clause 15- Indemnity against IPR, clause 25 – Confidentiality and liabilities arising due to wilful misconduct, gross negligence, third party claims and corrupt acts attributable to the Vendor.

**25 Confidentiality:**

The Vendor shall use the Confidential Information of the Purchaser only in furtherance of this Contract and shall not transfer or otherwise disclose the Confidential Information to any third party. The Vendor shall (i) give access to such Confidential Information solely to those employees with a need to have access thereto; and (ii) take the same security precautions to protect against disclosure or unauthorized use of such Confidential Information that the party takes with its own confidential information but, in no

event, shall a party apply less than a reasonable standard of care to prevent such disclosure or unauthorized use.

**26 Consequential Damages:**

Unless otherwise specified, neither Party shall be responsible for and nor shall be liable to the other Party for indirect/consequential losses and damages suffered by such Party including for loss of use, loss of profit whether such liability or claims are based upon any negligence on the part of the other Party or its employees in connection with the performance of the Purchase Order.

**27 New Legislation (The Micro, Small and Medium Enterprise Development Act 2006)**

a. This Act has been enacted and made effective from 2nd October 2006. The Interest on Delayed Payments to Small Scale and Ancillary Industrial Undertaking Act, 1993 is repealed.

b. Vendor is requested to inform the purchaser if vendor fall under The Micro, Small and Medium Enterprises Development Act, 2006 legislation and provide the purchaser, registration number and date to enable purchaser to take necessary care. The vendors are also requested to mention the same on their invoice / bill.

**28 Relation between parties:**

The Purchase Order shall be entered into on a principal-to-principal basis only. The Purchase order shall not be construed as a partnership or an association of persons. There is no agent and principal relationship between the parties. Each party shall be responsible for its own conduct. The Vendor shall ensure at all times that all the work carried out under this contract either by its own person or through any of its sub-Vendors shall be always done under its own direct supervision.

**29 Environment / ISO 14001 Certification:**

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

**30 Tata Code of Conduct**

The Purchaser abides by the Tata Code of Conduct in all its dealing with stake holders and the same shall be binding on the Purchaser and the Vendor for dealings under this Purchase Order. A copy of the Tata Code of Conduct is available at our website: http://www.tatapower.com/aboutus/code-of-conduct.aspx. The Vendor is requested to bring any concerns regarding this to the notice of our Chief Ethics Officer on the e-mail ID: cecounsellor@tatapower.com.

**31 Responsible Supply Chain Management:**

The Purchaser is committed for a cleaner environment and respect of Human rights through its Responsible Supply Chain Management policy. The Vendor is required to comply with all the environment & Human rights related laws, including emission norms, Labour and environmental regulations. The Purchaser encourages its Vendors/ Contractors/ Business partners to pay more attention to green design, green supply, green production, green logistics and green packaging in performing their business obligations.

The Vendor is required to abide by the Tata Power Corporate Environment policy, Energy Conservation and Corporate Sustainability Policy.

A copy of the Responsible Supply Chain Management Policy along with Environment policy, Energy Conservation policy, Sustainability policy, Health & Safety policy and Human Rights policy is available at website: http://www.tatapower.com/sustainability/policies.aspx.

Vendor/Bidder is required to completely fill the attached "Supplier Sustainability Questionnaire" in support of their Green Supply Chain Management initiatives and submit the same with their offer.

The Owner recognizes that diversity in the workplace positively impacts business. The Owner is committed to help people from SC/ST background either by helping them to become entrepreneurs or by engaging workforce from SC/ST community under the contracts agreed herein. To encourage engaging SC/ST community, the owner may consider on the merit to incentivize the Contractor by paying additional 1% of the service contract portion if the number of SC/ST workforce engaged in the contract exceeds 30% of the total deployed strength and 2%, if the strength goes beyond 50%. While the Contractor will assist the workforce so engaged to become self-reliant in meeting the work expectation, the Owner may also volunteer its training resources to the extent possible to improve their employability. The Contractor shall maintain the proper documentation of such category of the workforce engaged and the owner may consider to pay the incentive after its verification.

The Owner may also consider extending price preference of 5% in the bid evaluation for an order value up to Rs.50 Lacs, provided the company is owned by a person from SC/ST community having minimum 50% holding in the company.

**32 Vendor rating**

You are requested to ensure compliance to the terms of the individual orders with regards to timely delivery, provision of all applicable documents / challans / test certificate, quality of the material etc. Your performance with respect to the said factors will be taken into consideration for future business.

**33 Vendor Feedback:**

33.1 In this dealing Vendors feedback is important for the purchaser to improve its processes. If vendor have to report any grievance, problem or require any clarification, information, vendor is requested to contact purchaser at email ID: CC_CUSTOMERFEEDBACK@tatapower.com

33.2 Vendor is requested to ensure compliance to the terms of the individual orders with regards to timely delivery, provision of all applicable documents / challans / test certificate, quality of the material etc. Vendor performance with respect to the said factors will be taken into consideration for future business.

**34 Non-Waiver:**

Failure of Purchaser or its representatives to insist upon adherence to any of the terms or conditions incorporated in the Contract or failure or delay to exercise any right or remedies herein or by law accruing, or failure to promptly notify the Vendor in the event of breach or the acceptance of or the payment of any Material(s) hereunder or approval of any design or Material(s) shall not release the Vendor and shall not be deemed a waiver of any right of Purchaser to insist upon the strict performance thereof or of any of its rights or remedies as to any such Material(s) regardless of when the Material(s) are shipped, received or accepted not shall any purported oral modification or revisions of the Contract by Purchaser or its representative(s) act as waiver of the terms hereof.

35 **Repeat Order**:

Purchaser may place the repeat order for 100% of ordered quantities within a span of 6 months from the date of issue of this Purchase Order & Vendor shall execute it at same rates, terms and conditions.

**36 Severability**

If any provision of this Contract is invalid, unenforceable or prohibited by law, this Contract shall be considered divisible as to such provision and such provision shall be inoperative and shall not be part of the consideration moving from any Party hereto to the others, and the remainder of this Contract shall be valid, binding and of like effect as though such provision was not included herein.

# ESG FRAMEWORK FOR BUSINESS ASSOCIATES

Tata Power's Sustainability philosophy sits at the core of its Business Strategy. Tata Power Sustainability Model has an overarching objective of 'Leadership with care' with key elements of 'Care for the Environment'; 'Care for the Community'; 'Care for our Customers / Partners' and 'Care for our People'. These sustainability objectives encompass the Environmental, Social and Governance objectives driven as integrated elements.

Tata Power, together with its stakeholders is determined to achieve sustainable growth while creating shared value for all.
As a part of future ready roadmap, Tata Power has targeted following as our Environment, Social and Governance priorities:

- Being Carbon Net Zero before 2045
- Growing Clean capacity (80% by 2030)
- Customer centricity
- Becoming water neutral before 2030
- Achieving zero waste to landfill before 2030
- No net loss of biodiversity before 2030
- Positively impacting 80 million lives by 2027

In order to create a sustainable business ecosystem, Tata Power expects that all its Business Associates (BA) which includes its suppliers, vendors, consultants and service providers to align to its ESG and sustainability commitments.

Tata Power encourages improved efficiencies and scaling up of green initiatives through technology and innovation taking us farther on the journey of reducing carbon emissions and preparing the entire eco-system towards products and services that would have net positive impact on the environment and communities that we operate in.

The Vendors/ bidders wishing to associate with Tata Power are expected to share their own sustainability and ESG journey. We at Tata Power promote all Business Associates to have a sustainable procurement policy for their supplier and service providers to contribute to our integrated approach in achieving a sustainable supply chain. The BA is encouraged to carry out the assessment of their sub-contractors and sub-vendors on sustainability readiness so that they are aware of the expectation/ business requirement.

The Vendor/ Bidder shall fill-in the 'Environment, Social and Governance Compliance Screening Questionnaire for Business Associates' attached at Annexure-I and submit the same along with the Bid in Ariba online platform.

**Responsible Supply Chain Management:**

Tata Power is committed for a cleaner environment and respect of Human rights through its Responsible Supply Chain Management policy.
Tata Power Business Associate (BA) shall comply with all the environment & Human rights related laws, including emission norms, Labour and environmental regulations.

Tata Power encourages its BA to focus on green design, green supply, green production, green logistics and green packaging in performing their business obligations. The BA is expected to abide by the Tata Power Corporate Environment policy, Energy Conservation and Corporate Sustainability Policy (enclosed with this document as Annexure-II).

The BA is expected to:

- Strive towards Conservation of Energy, Water, Resources and optimize transportation of Men & Materials to minimize environmental impact and reduce carbon footprint.
- Carry out the assessment of materials used for construction, operation & maintenance, consumables and accordingly phase out those materials which are environmentally hazardous.
- Be cognizant that diversity in the workplace positively impacts business.
- Promote affirmative action by supporting people from SC/ ST background by engaging workforce from SC/ ST community under the contracts agreed herein.
- Share the commitment of 'No child labour', 'No forced labour', Non-discrimination on the basis of caste, colour, religion, gender, disability, maternity or pregnancy or any other factor unrelated to the requirements of the job
- Pay the wages or remuneration to the workforce, personnel deployed in compliance to all applicable laws and regulations.
- Provide its employees/ deployed labor with an employment environment that is free of physical or psychological harassment.
- Carry out the assessment of their Sub-contractors on their Sustainability Readiness so that they are aware of the above expectation/ standards
- To ensure usage of suitable package material which is more environmentally sustainable. Further the packing material shall be recycled to the extent possible. The material used for packing is expected to suit the mode of transport and to ensure its safe receipt at point of delivery.

**Waste Disposal:**

The BA is expected to follow best practices for disposal of waste, few of which are listed below:

- Have a detailed project plan that includes the waste management, segregation of all designated waste material (Recyclable/ Non-Recyclable), collecting, storing, disposing and transferring the same to pre-arranged facility/ destination in timely and safe manner as per environmental legislations. The project plan shall also include the innovative construction practice to eliminate or minimize waste, protect surface/ground water, control dust and other emissions to air and control noise.

- Have purchase policy to encourage the procurement of material with recycled and minimum packaging of goods during delivery and appropriate means for site-to-site transportation of materials to avoid damage and litter generation.

- Ensure that the residents living near the site are kept informed about proposed working schedule and timings/ duration of any abnormal noise full activity that is likely to happen.

- Ensure the regular maintenance and monitoring of vehicles and equipment for efficient fuel use so that emissions and noise are within acceptable limits to avoid air pollution.

**Water Management:**

The BA is expected to follow best practices for water management, few of which include a management and monitoring system for water withdrawals and consumption, procedures to reduce water usage or reuse/recycle water, and pretreatment of wastewater before disposal.

**Compliance to Law:**
The BA shall adhere to responsible business practices and comply with the provision of all the Statutory Acts Applicable. Special attention of the BA is drawn towards the compliance of provision of the following statues: (along with the latest amendments/additions, as applicable):

- The Child Labour (Prohibition and Regulation) ACT, 1986.
- The Contract Labour (Regulation and Abolition) ACT, 1970.
- The Employee's Pension Scheme, 1995.
- The Employee's Provident Funds and miscellaneous provisions Act, 1952.
- The Employees State Insurance Act, 1948.
- The Equal Remuneration Act, 1976.
- The Industrial Disputes Act, 1947.
- The Maternity Benefit Act, 1961.
- The Minimum Wages Act, 1948.
- The Payment of Bonus Act, 1965
- The Payment of Gratuity Act, 1972.
- The Payment of Wages Act, 1936.
- The Shops & Establishment Act, 1954.
- The Workmen's Compensation Act, 1923.
- The Employer's Liability Act, 1938.
- and any other applicable statutory act

**Social Accountability (SA 8000):**

Tata Power expects its BAs to follow guidelines of SA 8000:2014 on the following aspects

- Child Labour
- Forced or Compulsory Labour
- Health & Safety
- Freedom of Association & Right to Collective Bargaining
- Discrimination
- Disciplinary Practices
- Working Hours
- Remuneration
- Management System

**Health and Safety**

The BA is expected to ensure the health and safety of his and his Sub-contractor's staff and labour. The BA shall, in collaboration with and according to the requirements of the local health authorities, ensure that medical staff, first aid facilities, sick bay and ambulance service are available at the accommodation and on the Site at all times, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics. The BA shall maintain records and make reports concerning health, safety and welfare of persons deployed, and damage to property, as the Owner's Representative may reasonably require. The BA shall be responsible for the medical treatment / hospitalization of his and his Sub-contractor's staff/ labour.

The BA shall appoint a qualified Safety officer at the Site to be responsible for maintaining the safety, and protection against accidents, of all personnel on the Site. Such Safety officer shall have the authority to issue instructions and take protective measures to prevent accidents.

The BA shall comply in toto with the Tata Power's Contractor Safety Terms & Conditions, Health Safety & Environment Manual while working on Tata Power Site/ Services/ Contracts.

**Grievance Mechanism**

The BA is expected to have grievance procedures that allow stakeholders to anonymously bring environmental and/or work-related violations and/or concerns to the attention of management. In addition, the BA is expected to have procedures for examining reports of environmental and/or work-related violations or concerns and/or privacy complaints.

**Data Protection**

The BA is expected to have a formal process to address data security or privacy issues.

# ANNEXURE-I

| Sr. No. | Question Description | Response (Y/N) | Remarks |
|---|---|---|---|
| Organization | | | |
| 1 | Does your Company have Sustainability Policy at Organization Level?<br>If Yes, Please attach | | |
| 2 | Do you have sustainable procurement policy in place for your own suppliers? If Yes, Please attach | | |
| 3 | Does your company do regular assessment of its suppliers on ESG parameters? | | |
| 4 | Are there ESG risks, or negative impacts identified in your supply chain | | |
| Governance | | | |
| 1 | Is diversity taken into consideration when appointing board members/ senior management? Do you have an independent director/s? | | |
| 2 | Has your company taken initiatives to ensure ethical practices at workplace?<br>Please share the details, Policies etc. | | |
| 3 | Does your company have a formal process to address data security or privacy issues?<br>Please share the details, Policies etc. | | |
| 4 | Does your company have grievance mechanism for stakeholder issues and track resolution? | | |
| Environment/ Planet | | | |
| 1 | Does your company have Environmental Policy? If Yes, Please attach | | |
| 2 | Do you have a formal process for waste management including solid wastes, liquid wastes and hazardous waste? | | |
| 3 | Does your company track greenhouse gas emission? Also, what percentage of own consumption comes from the renewable energy? | | |
| 4 | Does your company have a formal process for water management including monitoring of water consumption and withdrawals, and if applicable, pretreatment of wastewater? | | |
| Green Technology/ Innovation | | | |
| 1 | Are your facility/ Product/ Services provided by you is based on green design, green production, green packaging or green logistics considerations? Please elaborate. | | |
| 2 | Do your products or services have any environmental or social features or benefits (e.g. environmental/energy certification, ecolabels, fair trade certification, etc.)? | | |
| Social/ People | | | |
| 1 | Does you facility/ Company have written personnel policies in place Are you an equal opportunity employer? | | |
| 2 | Please describe any formal programme / campaign in place to promote company involvement with the community (volunteering, etc.). What is the percentage of profit spend on community activities? | | |
| 3 | Does your company have a written Health & Safety Policy or Program? If Yes, Please attach | | |
| Certifications: Does your company have following certifications (valid till date-please mention validity) | | | |
| 1 | ISO9001 accreditation | | |
| 2 | SA8000 or equivalent | | |
| 3 | ISO 14001 certification | | |
| 4 | ISO 18001/45001 or equivalent | | |
| 5 | ISO/IEC 27001 or equivalent | | |
| 6 | Any Other (Please specify) | | |

Signature

Business Associate Name

# ANNEXURE-II

Tata Power, our Sustainability Policy integrates economic progress, social responsibility a
vironmental concerns with the objective of improving quality of life. We believe in integrati
r business values and operations to meet the expectations of our customers, employe
rtners, investors, communities and public at large

We will uphold the values of honesty, partnership and fairness in our relationship w
stakeholders

We shall provide and maintain a clean, healthy and safe working environment for employe
customers, partners and the community

We will strive to consistently enhance our value proposition to the customers and adhere
our promised standards of service delivery

We will respect the universal declaration of human rights, International Labour Organizatio
fundamental conventions on core labour standards and operate as an equal opportunit
employer

We shall encourage and support our partners to adopt responsible business policies, Busine
Ethics and our Code of Conduct Standards

We will continue to serve our communities:

- By implementing sustainable Community Development Programmes including throu
public/private partnerships in and around our area of operations
- By constantly protecting ecology, maintaining and renewing bio-diversity and wherev
necessary conserving and protecting wild life, particularly endangered species
- By encouraging our employees to serve communities by volunteering and by sharing th
skills and expertise
- By striving to deploy sustainable technologies and processes in all our operations and u
scarce natural resources efficiently in our facilities
- We will also help communities that are affected by natural calamities or untowa
incidence, or that are physically challenged in line with the Tata Group's efforts

e management will commit all the necessary resources required to meet the goals
rporate Sustainability.

# Supplier Code of Conduct

Tata Power follows the Tata Code of Conduct (TCoC) and the Whistle blower Policy and expect all its Suppliers to adhere to the same principles. **"Supplier"** here means any business, company, corporation, person or other entity that provides, sells or seeks to sell, any kind of goods or services to Tata Power, including the Supplier's employees, agents and other representatives. The suppliers are expected to adhere to the following Do's and Don'ts:

## Do's

1. The Suppliers shall be committed to supplying products and services of high quality that meet all applicable standards and laws, including product packaging, labelling and after-sales service obligations.
2. Comply with all applicable laws and regulations, both in letter and in spirit, in all the territories in which it operates.
3. Strive to provide a safe, healthy and clean working environment for its employees.
4. Strive for environmental sustainability, particularly with regard to the emission of greenhouse gases, consumption of water and energy and the management of waste and hazardous materials.
5. The Supplier shall represent our company (including Tata brand) only with duly authorised written permission from our company.
6. Safeguard the confidentiality on the use of intellectual property, information and data of the Company.
7. Gifts and hospitality given or received should be modest in value and appropriate as per Company Policy.
8. The assets of Tata Power shall be employed primarily and judiciously for the purpose of conducting the business for which they are duly authorised.
9. All actual or potential conflicts due to financial or any other relationship with a Tata Power employee shall be disclosed.

## Don'ts

1. The Supplier shall not make unfair or misleading statements about the products and services of competitors.
2. Children shall not be employed at workplaces.
3. Forced labour shall not be used in any form.
4. The Suppliers shall neither receive nor offer or make, directly or indirectly, any illegal payments, remunerations, gifts, donations or comparable benefits that are intended, or perceived, to obtain uncompetitive favours for the conduct of its business with Tata Power.

## Reporting Violations

The Supplier shall notify the Company regarding any known or suspected improper behaviour of other suppliers or employees relating to its dealings with Tata Power, by email to: cecounsellor@tatapower.com.

The same can also be raised through our 3rd party ethics helpline facility:

1. Email id: tatapower@ethics-line.com ; Website: www.tip-offs.com
2. Helpline numbers: Toll free - 0008001004382 and 0008001008277. Also accessible at normal domestic call rates within India: +91-11-71279005
3. Postal address: Deloitte Touche Tohmatsu India LLP
   c/o Arjun Rajagopalan, Partner (Ethics Helpline Services)
   19th Floor, 46 - Prestige Trade Tower, Palace Road,
   High Grounds, Bengaluru, Karnataka – 560001

# AGREED TERMS & CONDITIONS (ATC)- Indigenous Supply

**Bidder's Name:** M/s. _____

**RFQ ref. No.** CC25VJS008

**Enquiry Description:** Supply of 20 MVA 33/11 kV Ester filled Transformer with NIFPS for Mounte South DSS

**Bidder's Offer Ref.:** *<pls mention your offer reference no here>*

1. SUBMISSION OF THIS DOCUMENT DULY SIGNED, SHALL CONSTRUE THAT ALL THE CLAUSES OF AGREED TERMS AND CONDITIONS HAVE BEEN ACCEPTED BY YOU. PURCHASE ORDER, IF ANY, SHALL BE GOVERNED BY THE CONFIRMATION PROVIDED HERE.

| S. No. | Description | BIDDER'S RESPONSE |
|---|---|---|
| **A** | **TECHNICAL** | |
| 1 | Acceptance of technical specifications / scope of work including General/Technical notes as per Tender specification<br>**In case of deviation, confirm that the same has been furnished separately.** | |
| 2 | Confirm data sheets duly filled in have been submitted, wherever required as requested in Technical specification/ Scope of work | |
| **B** | **COMMERCIAL** | |
| 3 | **Bid Validity**<br>Confirm Bid Validity 180 days from date of bid submission. | |
| 4 | **Firm price:**<br>Price Variation applicable with base month as April last week. | |
| 5 | **Delivery Terms**<br>Confirm delivery terms DAP (FOR) basis for any spares/consumables | |
| 6 | **Packing & Forwarding**<br>Confirm that Packing & Forwarding charges including Special Packaging Requirement (if applicable) are included in base price | |
| 7 | **Freight Charges**<br>Confirm that Freight charges are included in base price | |
| 8 | **Taxes and duties:**<br>GST: __%<br>HSN/ SAC Code:<br>Any other tax as applicable: | |
| 9 | **Price Reduction / LD / SLA**:<br>Confirm that Bidder agrees to the LD charges as specified in GTC Supply | |
| 10 | **Delivery Period:**<br>Mention the delivery timelines from the date of order | |
| 11 | **Payment Terms Acceptance:**<br>Confirm acceptance to the Payment terms as specified in GCC Supply. | |
| 12 | **Warranty / Latent Defect Liability Period:**<br>Confirm that Bidder agrees to the clause as specified in Technical specs | |
| 13 | **Contract Performance Bank Guarantee**:<br>Confirm acceptance to Submission of Unconditional Bank | |

| S. No. | Description | BIDDER'S RESPONSE |
|---|---|---|
| | Guarantee as per GCC Supply. | |
| 14 | **Testing and Inspection charges (if applicable):**<br>Confirm the quoted are Inclusive of all testing and inspection charges as per Tender specification | |
| 15 | **Compliance to other terms & conditions**<br>Acceptance of all other terms & conditions as forming the Part of the RFQ/ Tender document and communicated vide subsequent addendum(s) if any:<br>**In case of deviation, confirm that the same has been furnished separately.** | |

*Bidders / Vendor shall note that in case of any contradiction between the Agreed Terms and Conditions (ATC); and the Bidders offer, the ATC shall prevail.

Bidder's Authorised Signatory and stamp:

Name: