

The Tata Power Company Ltd		<i>OPEN TENDER NOTIFICATION</i>
<i>Tender Reference: CC26VJS001</i>		<i>Document Date: 10th Mar 2025</i>

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.	OLA of 2 years for Supply of Oil DTs for Mumbai Distribution	CC26VJS001	4,00,000/-	2,000 /-	20 th March 2025

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

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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

OLA of 2 years for Supply of Oil DTs for Mumbai Distribution.

**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**

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Section A : Tender Notice including Instruction to Bidders

1. Tender Details

1.1 Key Tender Specific Details

Reference Number	CC26VJS001
Description	OLA of 2 years for Supply of Oil DTs for Mumbai Distribution
Type of Tender	Out Line Agreement
Estimated Period	Two Years
Tender Fee	Rs 2000/-
Earnest Money Deposit (EMD)	Rs 4,00,000/- Rs. Four Lakhs Only PLEASE NOT THAT IT IS MANDATORY TO SUBMIT EMD IN BANK GUARANTEE FORMAT ONLY
Price Basis	On Price Variation Basis
Executive Handling this Tender*	Name: Mr. Vinayak Shinde E-Mail ID: vinayak.shinde@tatapower.com
Technical Query *	Name: Mr. Ajay Potdar E-Mail ID: avpotdar@tatapower.com

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

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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 19 th March 2025 , up to 1500 Hours
(b)	Access to Tender Documents through E-Tender system to authorized person of Interested Bidder	19 th March 2025
(c)	Last Date of receipt of pre-bid queries, if any.	By 24 th March 2025
(d)	Last Date of Posting Consolidated replies to all the pre-bid queries as received	28 th March 2025
(e)	Last date and time of receipt of Bids	7 th April 2025 by 15:00 Hrs.*

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.

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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		

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	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.

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1.6 Qualification Criteria

S.No.	Description	Qualifying Criteria	Evaluation Documents Required
1	Infrastructure	Bidder must be an OEM of Equipment with manufacturing facility in India. The bidder must have in-house routine and acceptance testing facilities as per specifications and relevant IS/IEC.	Bidder must submit undertaking in this regard
2	Supply and Experience	<p>The bidder must have supplied for same (500kVA) or higher size and voltage Oil type DT (mineral oil / Ester oil),</p> <ul style="list-style-type: none"> a) A minimum of 32 nos during last 3 years or b) A single order of 16 nos or c) Two orders of 10 nos last 3 years. <p>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.</p>	<p>Purchase Order Copies and Completion Certificates.</p> <p>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.</p>

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S.No.	Description	Qualifying Criteria	Evaluation Documents Required
	Type Test	<p>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 conducted on the equipment / material of the same design meeting IS guidelines.</p> <p>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).</p> <p>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 and within 120 days of outline agreement.</p>	<p>Type Test Report.</p> <p>Undertaking that there is no change in design / material of construction (MOC) if Type Test Report older than 5 years.</p> <p>Undertaking that 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 Type Test reports shall be submitted before dispatch of the equipment / material and within 120 days of outline agreement.</p>
5	Commercial Capability	Average of Annual turnover of the bidder for last three years shall not be less than Rs. 20 Crs.	Copies of audited Balance Sheet and P&L Statements along with UDIN number to be submitted in this regard.
6	Performance	The bidder should have performance certificates for 2 years 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

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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** 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

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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:

The prices shall be subject to IEEMA Price Variation Clause with following conditions:

IEEMA formulae and factors governing the price variation shall be as follows:

$$P = \frac{P_o}{100} (7 + 41 \frac{C}{CO} + 23 \frac{ES}{ESO} + 10 \frac{IS}{ISO} + 5 \frac{IM}{IMO} + 8 \frac{TO}{TOo} + 6 \frac{W}{Wo})$$

P Price payable as adjusted in accordance with the formula
P_o Price quoted / confirmed (Each)

C Price of Copper - Applicable in the Month of ordering.
C_o Price of Copper - as per base month of tender.

ES Price of CRGO - Applicable in the Month of ordering.
E_{So} Price of CRGO - as per base month of tender.

IS Price of HR Coil of 3.15mm - Applicable in the Month of ordering.
I_{So} Price of HR Coil of 3.15mm - as per base month of tender.

IM Price of Insulating Materials - Applicable in the Month of ordering.
I_{Mo} Price of Insulating Materials - as per base month of tender.

TO Price of Transformer Oil - Applicable in the Month of ordering.
T_{Oo} Price of Transformer Oil - as per base month of tender.

W All India average Consumer price index - Applicable in the Month of ordering.
W_o All India average Consumer price index average - as per base month of tender.

- Base circular shall be Feb 2025 circular issued in Mar. 2025. Base month for Bid Price shall remain same throughout the negotiation process till Outline Agreement / Rate Contract is finalized. Base month circular has to be attached in the Price Bid.

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- Whenever Firm Order has to be placed against Outline Agreement / Rate Contract Tata Power shall seek PVC corrected price based on index published and available during the said month from the bidder. Purchase Order against Outline Agreement / Rate Contract will be placed at PVC corrected price. The said price shall then remain firm till completion of delivery and bill payment.
- There will be no cap on both positive and negative side.

Note : If due date of bid submission is extended due to any reason, the base date will remain unchanged for the calculation of PV clause

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.

Tata Power Bank details for EMD BG / NEFT:

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

The hard copy of EMD in a sealed envelope should be sent on address mentioned in Tender document. Pls mail the UTR details in case of NEFT for verification.

First Part has to be submitted in Sealed Envelope.

SECOND PART: “TECHNICAL / UN-PRICED COMMERCIAL BID” shall contain the following documents:

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- 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 through 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 BG to be sent in a sealed envelope which shall be clearly marked as below to the below address.

EMD

"Please mention Tender Reference No"

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,

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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.

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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.

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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

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<i>Tender Reference: CC26VJS001</i>		<i>Document Date: 10th Mar 2025</i>

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 Contract 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.

The Tata Power Company Ltd		<i>OPEN TENDER NOTIFICATION</i>
<i>Tender Reference: CC26VJS001</i>		<i>Document Date: 10th Mar 2025</i>

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.

---XXX---

CONFIDENTIAL

The Tata Power Company Ltd		OPEN TENDER NOTIFICATION
Tender Reference: CC26VJS001		Document Date: 10 th Mar 2025

Annexure 1

Schedule Of Items

Sr. no.	Material / Service Short Text (as per SAP)	Quantity	UoM	Unit Rate (Basic)	Total
1	TRF DIST, W/O OLTC,6.6KV/415V,1250KVA	1	nos.		-
2	TRF DIST, W/O OLTC 11KV/415V 630KVA	2	nos.		-
3	TRF DIST, W/O OLTC,11KV/415V,1250KVA	2	nos.		-
4	TRF DIST, W/O OLTC,630KVA,22KV/415V	1	nos.		-
5	TRF DIST, W/O OLTC,1250KVA,22KV/415V	5	nos.		-
6	TRANSFORMER,1250KVA,6.6KV,415V,KNAN	1	nos.		-
7	TRANSFORMER,800KVA,11KV,415V,KNAN	5	nos.		-
8	TRANSFORMER,1250KVA,11KV,415V,KNAN	4	nos.		-
9	TRANSFORMER,1600KVA,11KV,415V,KNAN	1	nos.		-
10	TRANSFORMER,2000KVA,11KV,415V,KNAN	1	nos.		-
11	TRANSFORMER,800KVA,22KV,415V,KNAN	3	nos.		-
12	TRANSFORMER,1250KVA,22KV,415V,KNAN	4	nos.		-
13	TRANSFORMER,1600KVA,22KV,415V,KNAN	1	nos.		-
14	TRANSFORMER,2000KVA,22KV,415V,KNAN	1	nos.		-
	Sub Total				-
	GST @18%				-
	Total with taxes				-

The Tata Power Company Ltd



TECHNICAL SPECIFICATION FOR
11kV/415V & 22kV/415 OIL FILLED
DISTRIBUTION TRANSFORMER

ENSE-DS-2008-R0

Date of Issue: 04/08/2023

TECHNICAL SPECIFICATION

11KV/415V & 22kV/415V Oil filled Distribution Transformer

The Tata Power Company Ltd.
Engineering Services (ENSE),
Distribution Division, Senapati Bapat Marg,
Lower Parel, Mumbai – 400013 Maharashtra

The Tata Power Company Ltd		TECHNICAL SPECIFICATION FOR 11kV/415V & 22kV/415V OIL FILLED DISTRIBUTION TRANSFORMER
ENSE-DS-2008-R0		Date of Issue: 04/08/2023

Document No: ENSE-DS-2008-R00

Document Title: Technical specifications for 22KV/415V & 11KV/415V Oil Filled Transformer

00	For tender purpose (ENSE-DS-2008-R00)	04/08/23	KSJ		AVP		RMB	
Rev			Prepared By	Checked By	Approved and Issued By			

The Tata Power Company Ltd.
Engineering Services (ENSE),
Distribution Division, Senapati Bapat Marg,
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Rev No.	Prepared By & Date	Checked By & Date	Approved for Issue By & Date
R00	 Ketan S. Jadhav Xx/xx/23	 Ajay V. Potdar Xx/xx23	Ravindra M. Bhanage Xx/xx/23

The Tata Power Company Ltd		TECHNICAL SPECIFICATION FOR 11kV/415V & 22kV/415V OIL FILLED DISTRIBUTION TRANSFORMER
ENSE-DS-2008-R0		Date of Issue: 04/08/2023

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- 2.0 APPLICABLE STANDARDS
- 3.0 CLIMATIC CONDITIONS OF THE INSTALLATION
- 4.0 GENERAL TECHNICAL REQUIREMENTS
- 5.0 GENERAL CONSTRUCTIONS
- 6.0 NAME PLATE AND MARKING
- 7.0 TESTS
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- 10.0 INSPECTION AFTER RECEIPT AT STORE
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- 24.0 ANNEXURE IV : STAR RATING LABLE GUIDLINES

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1	SCOPE	<p>1. This Specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing forwarding, supply and unloading at site/store and performance of Oil immersed, non-sealed, naturally cooled, three Phase 11/0.415 kV & 22/0.415kV, 50Hz, outdoor type Distribution Transformer.</p> <p>2. The transformer shall be complete with all components and accessories, which are necessary or usual for their efficient performance and trouble free operation under the various operating and atmospheric conditions specified in clause no. 3</p> <p>3. Such of the parts that may have not been specifically included, but otherwise form part of the transformer as per standard trade and/or professional practice and/or are necessary for proper operation of transformer, will be deemed to be also included in this specification. The successful bidder shall not be eligible for any extra charges for such accessories etc. notwithstanding the fact that at the time of an initial offer bidder had segregated such items and quoted for them separately.</p>																																						
2	APPLICABLE STANDARDS	<p>The equipment (and the materials used) covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian, IEC / International standards , with latest amendment from time to time, thereof, some of which are listed below:</p> <table border="1"> <thead> <tr> <th style="text-align: center;">Indian Standards (IS)</th> <th style="text-align: center;">Title</th> </tr> </thead> <tbody> <tr> <td>IS 5 : 2007</td> <td>Specification for Colors for ready mixed paints and enamels.</td> </tr> <tr> <td>IS 104 : 1979</td> <td>Specification for ready mixed paint, brushing, zinc chrome, priming.</td> </tr> <tr> <td>IS 191 : 2007</td> <td>Copper</td> </tr> <tr> <td>IS 335 : 1993</td> <td>Specification for New insulating oils</td> </tr> <tr> <td>IS 649: 1997</td> <td>Testing for steel sheets and strips and magnetic circuits.</td> </tr> <tr> <td>IS 1180 : 2014</td> <td>Outdoor Type Oil Immersed Distribution Transformers Up to and Including 2500 KVA, 33 kV-Specification.</td> </tr> <tr> <td>IS 1576: 1992</td> <td>Solid Pressboard for Electrical Purposes -Specification</td> </tr> <tr> <td>IS 1897: 2008</td> <td>Copper strip for electrical purposes</td> </tr> <tr> <td>IS 2026 : 2011</td> <td>Specification for Power Transformers</td> </tr> <tr> <td>IS 2099:1986</td> <td>Specification for bushings for alternating voltages above 1000 volts</td> </tr> <tr> <td>IS 2362:1993</td> <td>Determination of water content in oil by Karl in oil Fischer Method – Test Method.</td> </tr> <tr> <td>IS 3024 : 2006</td> <td>Grain oriented electrical steel sheets and strips.</td> </tr> <tr> <td>IS3347 (Part I): 1979</td> <td>Dimensions for Porcelain Transformer Bushings for Use in Normal and Lightly Polluted Atmospheres - Part 1 : Up to and including 1 kV</td> </tr> <tr> <td>IS 3401 : 1992</td> <td>Specification of silica Gel</td> </tr> <tr> <td>IS 4253: Part II: 1980</td> <td>Specification for cork composition sheets- Part II: Cork and Rubber.</td> </tr> <tr> <td>IS 4257(Part I): 1981</td> <td>Dimensions for Clamping Arrangements for Porcelain transformer Bushings - Part I: For 12 kV to 36 kV Bushings.</td> </tr> <tr> <td>IS 5082:1998</td> <td>Wrought Aluminum and Aluminum Alloy bars, Rods, Tubes, Sections, Plates and Sheets for Electrical Applications.</td> </tr> <tr> <td>IS 5561 : 1970</td> <td>Specification for Electric Power Connectors.</td> </tr> </tbody> </table>	Indian Standards (IS)	Title	IS 5 : 2007	Specification for Colors for ready mixed paints and enamels.	IS 104 : 1979	Specification for ready mixed paint, brushing, zinc chrome, priming.	IS 191 : 2007	Copper	IS 335 : 1993	Specification for New insulating oils	IS 649: 1997	Testing for steel sheets and strips and magnetic circuits.	IS 1180 : 2014	Outdoor Type Oil Immersed Distribution Transformers Up to and Including 2500 KVA, 33 kV-Specification.	IS 1576: 1992	Solid Pressboard for Electrical Purposes -Specification	IS 1897: 2008	Copper strip for electrical purposes	IS 2026 : 2011	Specification for Power Transformers	IS 2099:1986	Specification for bushings for alternating voltages above 1000 volts	IS 2362:1993	Determination of water content in oil by Karl in oil Fischer Method – Test Method.	IS 3024 : 2006	Grain oriented electrical steel sheets and strips.	IS3347 (Part I): 1979	Dimensions for Porcelain Transformer Bushings for Use in Normal and Lightly Polluted Atmospheres - Part 1 : Up to and including 1 kV	IS 3401 : 1992	Specification of silica Gel	IS 4253: Part II: 1980	Specification for cork composition sheets- Part II: Cork and Rubber.	IS 4257(Part I): 1981	Dimensions for Clamping Arrangements for Porcelain transformer Bushings - Part I: For 12 kV to 36 kV Bushings.	IS 5082:1998	Wrought Aluminum and Aluminum Alloy bars, Rods, Tubes, Sections, Plates and Sheets for Electrical Applications.	IS 5561 : 1970	Specification for Electric Power Connectors.
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	IS 6103 : 1971	Specification for Testing of specific resistance of electrical insulating liquids.										
	IS 6262 : 1971	Method of test for power factor and dielectric constant of electrical insulating liquids.										
	IS 6600:1972	Guide for loading of Oil-immersed transformer.										
	IS 6792:1992	Method for Determination of Electric Strength of Insulating Oil.										
	IS 7404 (Part-1): 1991	Paper Covered conductors: Round Conductors.										
	IS 7421:1988	Specification for porcelain bushings for alternating voltages up to and including 1000kv.										
	BIS IS 8603 (Part-1): 2008	Dimensions for Porcelain Transformer Bushings for Use in Heavily Polluted Atmospheres - Part I: 12 /17.5 kV, 24kV and 36 kV Bushings.										
	IS 9335:1979	Specification for Cellulosic Papers for Electrical Purposes										
	IS 10028: 1981	Code of Practice for Selection, Installation and Maintenance of Transformers.										
	IS 11149:1984	Specification for rubber gaskets										
	IS 12444: 1988	Specification for continuously cast and rolled electrolytic copper wire rods for electrical conductors.										
	IS 13964: 1994	Methods of measurement of transformer and reactor sound levels.										
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<p>Material conforming to other internationally accepted standards, which ensures equal or better quality than the standards mentioned above would be acceptable, subject to prior approval from Tata Power. In case the Bidders who wish to offer material conforming to the other standards, salient points of difference between the Standards adopted and the specific standards shall be clearly brought out in relevant schedule copy of such standards with authentic English Translation shall be furnished along with the offer. In the case of conflict the order of precedence shall be</p> <ol style="list-style-type: none"> 1) Indian Standards, 2) IEC Standards 3) Other alternative standards. 												

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

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11	Average Air Pressure	29.6-inch Hg
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The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.3 g. For Mumbai the atmosphere is mainly humid across year.

4	GENERAL TECHNICAL REQUIREMENTS									
SR. No.	Description									
1	Continuous Rated Capacity (kVA)	315 kVA	400 kVA	500 kVA	630 kVA	800 KVA	1 MVA	1.25 MVA	1.6 MVA	2 MVA
2	Application	Outdoor								
3.A	System voltage (max.) (11kV)	12 kV								
3.B	System voltage (max.) (22kV)	24 kV								
3.C	System voltage (max.) (6.6kV)	7.2kV								
4.A	Rated voltage HV (11kV)	11 kV								
4.B	Rated voltage HV (22kV)	22 kV								
4.C	Rated voltage HV (6.6kV)	6.6kV								
5	Rated voltage LV (V)	415 V								
6.A	Line current HV(11kV)	16.53 A	20.96 A	26.25 A	33.06 A	41.99 A	52.48 A	65.6 A	83.98 A	104.97A
6.B	Line current HV(22kV)	8.3 A	10.5 A	13.1 A	16.5 A	21.0 A	26.2 A	32.8 A	42.0 A	52.5 A
6.C	Line current HV(6.6kV) (Amps)							109.34		
7	Line current LV (A)	438.22 A	556.46 A	685.58 A	876.43 A	1112.9 A	1391.16 A	1739 A	2225.86 A	2782.33 A
8	Frequency (Hz)	50 Hz								
9	No. of Phases	Three								
10	Connection HV	Delta								
11	Connection LV	Star (Neutral Brought out)								
12	Vector group	Dyn-11								
13	Type of cooling	ONAN								
14	Tap changing arrangement	+10.0% to -10% in steps of 2.5% Off Load (OCTC)								

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ENSE-DS-2008-R0				Date of Issue: 04/08/2023			

15	No. of tap positions	9								
	Noise level at rated voltage and frequency (as per NEMA Tr-1)	56 dB	56 dB	56 dB	57 dB	57 dB	58 dB	60 dB	60 dB	61 dB
17	Permissible temperature rise over ambient:									
17.1	Of top oil measured by thermometer	40 °C								
17.2	Of winding measured by resistance	45 °C								
18.A	Max. Total Losses at 100% loading at 75°C (watts) (11kV)	3100	3450	4300	5300	6403	7700	9200	11800	15000
18.B	Max. Total Losses at 100% loading at 75°C (watts) (22kV)	3255	3622.5	4515	5565	6723.1	8085	9660	12390	15750
19.A	Max. Total Losses at 50% loading) at 75°C (Watts) (11kV)	1025	1225	1510	1860	2287	2790	3300	4200	5050
19.B	Max. Total Losses at 50% loading) at 75°C (Watts) (22kV)	1076.2	1286.2	1585.5	1953	2401.3	2929.5	3465	4410	5302.5
Note: For 22 KV, total losses shall not exceed 5% of above mentioned 11 KV respective ratings.										
20	Short circuit impedance voltage at 75°C (±10% tolerance)	4.50%	4.50%	4.50%	4.50%	5%	5%	5%	6.25%	6.50%
21	Insulation Class	A								
22	Normal Flux Density(at rated voltage and frequency)	1.69 T (Max)								
23	Maximum flux density (Increase of +12.5% combined voltage and frequency variation from rated voltage and frequency)	1.9 T (Max.)								
24	Maximum current density (A/mm ²)	2.5 A/mm ²								
25.A	Impulse withstand voltage (11kV)	75 kVp								

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25.B	Impulse withstand voltage (22kV)	125 kVp								
25.C	Impulse withstand voltage (6.6kV)	60 kVp								
26.A	Power frequency withstand voltage(11kV)	28 kV								
26.B	Power frequency withstand voltage(22kV)	50 kV								
26.C	Power frequency withstand voltage(6.6kV)	20 kV								
26.D	Power frequency withstand voltage (LV)	3 kV								
27	Voltage fluctuations permissible	+12.5% to -12.5%								
28	Neutral terminal	Two separate brought out neutral from main neutral bus bar, One for taking out the neutral for 4 wire system and other additional neutral for solid earthing.								
29	Neutral CT	All rating shall have protection class neutral CT instead of metering CT.								
29.1	Neutral CT Ratio for LV side	500/5	600/5	800/5	1000/5	1250/5	1500/5	2000/5	2500/5	3000/5
30	Minimum clearances in air (mm) :									
30.A	HV phase to phase/ phase to earth (11kV)	255 / 140								
30.B	HV phase to phase/ phase to earth (22kV)	330 / 230								
30.C	LV phase to phase/ phase to earth	75 / 40								
31	Minimum clearances in Cable Box (mm) :									
31.A	HV phase to phase/ phase to earth (11kV)	130 / 80								
31.B	HV phase to phase/ phase to earth (22kV)	240 / 140								
31.C	LV phase to phase/ phase to earth	25 / 20								
32	Wheels	The transformer shall be provided with four bi-directional rollers with locking arrangement suitable for rail gauges in both the axis for movement of transformer in either direction. Distance between wheels shall be center to center 820mm.								

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5	GENERAL CONSTRUCTION	<ol style="list-style-type: none"> 1. The transformer shall be double wound, copper coil, oil immersed, naturally cooled (ONAN) and non sealed type with plain rectangular tank. 2. The transformer shall be suitable for service with fluctuations in supply voltage up to plus 12.5% to minus 12.5%. 3. The transformer and accessories shall be designed to facilitate operation, inspection, maintenance and repairs. The design shall incorporate every precaution and provision for the safety of equipment as well as staff engaged in operation and maintenance of equipment. 4. All outdoor apparatus, including bushing insulators with their mountings, shall be designed so as to avoid any accumulation of water. 5. The transformer shall be designed suitable for service life of 25years.
5.1	CORE	<ol style="list-style-type: none"> 1. Transformer core shall be stack type , constructed from high grade cold rolled, non-ageing, grain oriented, silicon steel lamination which shall be properly annealed (under inert atmosphere, if required) to relieve stresses. 2. The core shall have low loss and good grain properties. It should be coated with hot oil proof insulation, bolted together with frames to prevent vibration and noise. 3. Core laminations should be coated with hot oil proof, with insulation coating, an inorganic coating equivalent to C-5 type as ASTM A976 or IS 3024, like Carlite -3. 4. All core should be clamped together with frames to prevent vibration and noise. The core clamping shall be preferably without through bolts and if any bolt used same shall be effectively insulated. 5. The core thickness should be 0.23mm or less and grade should be M3 or better. 6. All core clamping bolts (if any) shall be effectively insulated. 7. Only one grade and one thickness of core shall be accepted and mixing of different grades shall not be allowed. 8. The complete design of the core must ensure maximum permanency of the core losses without continuous working of the transformers. 9. The value of the maximum flux density allowed in the design and grade of lamination used shall be clearly stated. The vendor shall submit the calculations in support of the same. 10. The transformer shall be suitable for continuous service without damage under 'over fluxing' where the ratio of voltage over frequency exceeds the corresponding ratio at rated voltage and rated frequency up to 12.5% and the core shall not get saturated. 11. The No Load current shall not exceed 2% of the Full Load current and will be measured by energizing the transformer at rated voltage and frequency. Increase of 12.5% of rated voltage shall not increase the no-load current by 5% maximum of full load current. 12. The bidder shall be required to submit the following documents in regard to procurement of core material: <ol style="list-style-type: none"> 1. Invoice of supplier 2. Mill's test certificate 3. Packing list 4. Bill of landing 5. Bill of entry certificate by custom 6. Description of material, electrical analysis, physical inspection certificate for surface defects, thickness and width of material. 13. The bidder shall offer the core for inspection and approval of Tata power during the manufacturing stage. Heavy penalty or black listing shall be imposed on the bidders using defective CRGO sheets.

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5.2	WINDING CONNECTIONS	<ol style="list-style-type: none"> Primary and secondary windings shall be constructed from high- conductivity (copper conductors), Double Paper Covered (DPC) copper conductor with min.25% overlap per layer. Super enamel conductors are not accepted. The bidder shall submit characteristics of insulation paper with the offer. The current density for HV and LV winding should not be more than 2.5 Ampere per sq.mm. The insulation between core and bolts and core and clamps shall withstand 2.5 kV for one minute. Inter layer insulation both for HV and LV windings shall be Epoxy dotted Kraft paper and pressboard of standard make or any other superior material subject to approval of Tata Power. All spacers, axial wedges / runners used in windings shall be made of pre-compressed solid pressboard. In case of cross-over coil winding of HV all spacers shall be properly sheared, and dovetail punched to ensure proper locking. All axial wedges/runners shall be properly milled to dovetail shape so that they pass through the designed spacers freely. Insulation shearing, milling and punching operations shall be carried out in such a way, that there should not be any burr and dimensional variations. Proper bonding of inter layer insulation with the conductor shall be ensured. Test for bonding strength shall be conducted as per standards. LV winding shall be such that neutral formation is at the top. All turns of windings shall be adequately supported to prevent movement. The core/coil assembly shall be securely held in position to avoid any movement under short circuit conditions. 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. 																																								
5.3	LOSSES	<ol style="list-style-type: none"> The bidder shall guarantee the total loss at 50% and 100% load condition (at rated voltage and frequency and at 75°C) and these should be within the limits of maximum total losses declared by Tata Power for both 50% and 100% loading values (as per table below). <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Description</th> <th style="text-align: center;">315 kVA</th> <th style="text-align: center;">400 kVA</th> <th style="text-align: center;">500 kVA</th> <th style="text-align: center;">630 kVA</th> <th style="text-align: center;">800 KVA</th> <th style="text-align: center;">1 MVA</th> <th style="text-align: center;">1.25 MVA</th> <th style="text-align: center;">1.6 MVA</th> <th style="text-align: center;">2 MVA</th> </tr> </thead> <tbody> <tr> <td>Max. Total Losses at 100% loading at 75°C (watts) (11kV)</td> <td style="text-align: center;">3100</td> <td style="text-align: center;">3450</td> <td style="text-align: center;">4300</td> <td style="text-align: center;">5300</td> <td style="text-align: center;">6403</td> <td style="text-align: center;">7700</td> <td style="text-align: center;">9200</td> <td style="text-align: center;">11800</td> <td style="text-align: center;">15000</td> </tr> <tr> <td>Max. Total Losses at 100% loading at 75°C (watts) (22kV)</td> <td style="text-align: center;">3255</td> <td style="text-align: center;">3622.5</td> <td style="text-align: center;">4515</td> <td style="text-align: center;">5565</td> <td style="text-align: center;">6723.1</td> <td style="text-align: center;">8085</td> <td style="text-align: center;">9660</td> <td style="text-align: center;">12390</td> <td style="text-align: center;">15750</td> </tr> <tr> <td>Max. Total Losses at 50% loading) at 75°C (Watts) (11kV)</td> <td style="text-align: center;">1025</td> <td style="text-align: center;">1225</td> <td style="text-align: center;">1510</td> <td style="text-align: center;">1860</td> <td style="text-align: center;">2287</td> <td style="text-align: center;">2790</td> <td style="text-align: center;">3300</td> <td style="text-align: center;">4200</td> <td style="text-align: center;">5050</td> </tr> </tbody> </table>	Description	315 kVA	400 kVA	500 kVA	630 kVA	800 KVA	1 MVA	1.25 MVA	1.6 MVA	2 MVA	Max. Total Losses at 100% loading at 75°C (watts) (11kV)	3100	3450	4300	5300	6403	7700	9200	11800	15000	Max. Total Losses at 100% loading at 75°C (watts) (22kV)	3255	3622.5	4515	5565	6723.1	8085	9660	12390	15750	Max. Total Losses at 50% loading) at 75°C (Watts) (11kV)	1025	1225	1510	1860	2287	2790	3300	4200	5050
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Max. Total Losses at 50% loading) at 75°C (Watts) (22kV)	1076 .2	1286 .2	1585 .5	1953	2401 .3	2929 .5	3465	4410	5302.5
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Note: For 22 KV, total losses shall not exceed 5% of above mentioned 11 KV respective ratings.

No positive tolerance shall be allowed on the losses as mentioned above. However, bidder can offer losses less than specified but no consideration in cost will be given for the same.

- The successful bidder shall guarantee the quoted losses for at least five years. If at any point of time during operation if it is found that the total losses at 50% and 100% load are more than the values given in specifications, then bidder shall be liable to pay a fine of Rs 250 per watt to the amount by which losses at 50% loading and 100% loading increase the values given in specifications.**
- During testing at Bidder's works if it is found that the actual measured losses are more than the values quoted by the Bidder, TATA POWER shall reject the transformer and shall have the right to reject the complete lot.
- During testing at Bidder's works, if the temperature rise exceeds the specified values, the entire lot shall be rejected by TATA POWER.
- During testing at Bidder's works, if the impedance values differ from the guaranteed values including tolerance, the transformer shall be rejected by TATA POWER.

5.4

**TRANSFORMER
TANK
AND
TANK
CONSTRUCTION**

- The transformer tank shall be of robust construction, **rectangular in shape** and shall be built up of electrically tested welded mild steel plates.
- The tank shall be fabricated by welding at corners. No horizontal or vertical joints in tank side walls and its bottom or top cover shall be allowed.
- All welding operations should be carried by **qualified welders** (performance qualification certificates to the customer) as per the relevant ASME standards and a copy of the **welding procedure** has to be submitted to TATA POWER.
- The **thickness of tank** should be as below:

Top and Bottom	6 mm (minimum)
For Sides	5 mm (minimum)

- The tolerances as per IS 1852 shall be applicable.**
- In addition, the cover of the main tank shall be provided with an **air release plug**.
- The tank plates shall be of such strength that the complete transformer when filled with oil may be lifted bodily by means of the lifting lugs provided. The top cover shall have no cut at point of lifting lug.
- The transformer tank cover shall be bolted/clamped alternatively welded with tank rim to make a leak proof joint. The curb design shall be such that it is possible to remove the weld and re weld the tank at least two times.
- The tank plate and lifting lugs shall be of such strength that the complete transformer filled with oil may be lifted by means of lifting shackle.
- The tank cover shall have slight slope (10 mm ± 2mm) towards HV side to drain rainwater.
- There must be sufficient space from the core to the top cover to take care of oil expansion. The oil volume inside the tank shall be such that even under the extreme operating conditions, the **pressure generated inside the tank does not exceed 0.4 kg/sq. cm**

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positive or negative and the tank shall be of adequate mechanical strength to withstand it.

12. The transformer should be capable of withstanding 0.8kg/sq.cm and a vacuum of 0.7kg/sq.cm. The permanent deflection of the flat plate, when the tank without oil is subjected to a vacuum of 525 mm of mercury shall not be more than the values specified:

Length of Plate	Deflection
Up to 750 mm	5.0 mm
751 mm to 1250 mm	6.5 mm
1251 mm to 1750 mm	8.0 mm
Above 1750 mm	9.0 mm

13. The tank design shall be such that the core and the windings can be lifted freely without dismantling the bushings.
14. The tightening torque chart to be provided for all bolts used. Bolt grade 5.6 or higher TS. This shall be submitted along with each rating drawings.
15. An enclosure of MS with terminal block should be provided on tank body so as to facilitate the connection of energy meter to DT .Also, suitable holes with glands to be provided on bottom side of this box as incoming and outgoing for 10 core 2.5 sq.mm cable.
16. **Lifting Lugs:**
The transformer shall be provided with a minimum of four welded heavy duty enclosed lifting lugs of Structural steel E250 or better grade quality A (Minimum quality A) as per IS 2062 plate of minimum 16mm thickness and 165mm welding length on tank for lower rating 160 & 250kVA. Minimum 20mm thickness and 165mm welding length on tank for 400kVA, 500kVA, Minimum 20mm thickness and 180mm welding length on tank 630kVA, Minimum 22mm thickness and 200mm welding length on tank for 1000kVA. This shall gradually increase for higher rating as per weight. These shall be reinforced with vertical supporting flat stiffener below lug up to stiffener angle. This shall have smooth min. 7mm welding on all sides. This is to be checked during routine testing of tank & stage inspections.
17. **All transformer lifting lug shall be painted with yellow colour.**
18. The location of lifting lugs shall be such that the clearance between lifting chain and nearest part of bushing or PRV or other part shall be at least 100 mm.
19. There shall be facilities for lifting the core coil assembly separately.
20. The lifting lugs shall be designed in such a way that any two diagonal lugs are capable of lifting two times of the total weight of the transformer. The design of should be such that it should be suitable for 120degree lifting rope angle as per ASME B30.9 and at any point of time the maximum stress allowed on the Lug martial shall be lesser than 82MPa as per ANSI C.57.12.10
21. Calculation sheet for Lifting lug design to be submitted by Bidder. The calculation shall include the Stress on lifting lug material and stress on welding both. The Stress on the welding should be less than 840kg/cm2 as per ANSI C.57.12.10. All calculation to be done for considering lifting on any diagonal opposite two lugs conditions.
22. The lifting lugs shall be located on the side walls only and conservator on LT box side. Separate drawing to be submitted stating welding thickness, welding length (min. 120mm for 160KVA and higher as per rating and load) and location on tank along with stiffener support for all rating and all lugs.
23. All joints of tank and fittings shall be oil tight and no bulging shall occur during service.
24. Inside of tank shall be painted with hot oil restraint paint and minimum oil level mark shall be embossed inside the tank (at 25° C).
25. Anti –theft stainless steel fasteners with breakaway nut shall be provided at top cover (minimum 4 no's at corners).
26. The maximum overall size of DTs(including tolerance) shall be as mentioned below:

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5.5	RADIATORS	<ol style="list-style-type: none"> Radiators of pressed steel type conforming to the design requirement shall be provided. The Pressed Steel type should be used in vertical formation without any bending and should be individually tested for leakage and pressure test etc. before welding with the main tank. Thickness of sheet for radiators shall be 1.20 mm (min). The mounting of the radiators shall be non- detachable type (i.e., they should be welded permanently with the tank). The number / cross section / length / fixing arrangement of radiators shall be indicated in the general assembly drawing. Radiator thickness must be uniform without any dent or damage and also no bulging or concave should occur even after performing pressure/ vacuum test and temperature rise test. Corrugated designs are not accepted. 												
5.6	GASKET	Nitrile / Neoprene / cork rubber gaskets conforming to Type III as per IS 11149/Type C as per IS 4253 (Part-2) shall be provided.												
5.7	TAPS	<ol style="list-style-type: none"> Tap changing shall be carried out by means of an externally operated self-position switch and when the transformer is in de-energised condition. The taps shall be provided in HV winding and each tap change shall result in voltage variation of 2.5%. Switch position no.1 shall correspond to the maximum plus tapping (i.e., +10%) and position no.9 shall correspond to minimum tapping (i.e.,-10%). Provision shall be made for locking the tapping switch handle in position. Suitable plate shall be fixed for tap changing switch to know the position number of tap. 												
5.8	BUSHINGS	<p>HT Bushings:</p> <table border="1"> <tbody> <tr> <td>11kV</td> <td>12kV</td> <td>250A</td> </tr> <tr> <td>22kV</td> <td>24kV</td> <td>250A</td> </tr> </tbody> </table> <ol style="list-style-type: none"> For Plinth mounted transformers: Transformer shall be with HT cable box on Sideways having porcelain rod bushing. Rods and nuts shall be made of tinned brass material. Bushing shall have creepage distance of 25mm/KV. Tinned Copper busbar of 100mm long with 50mmx6mm Size: The tinned copper busbar to be provided on HV cable box one size shall fixed in bushing stud with tinned brass bolts and washers. Other side should have hole with M16 bolts for fixing of Lug. All transformers shall be plinth mounted with HT side cable box, with bushing having creepage distance of 25mm/kV. <p>LT Bushings (1.1kV/suitable current rating):</p> <ol style="list-style-type: none"> The bushings shall be of outdoor type made of porcelain material and rods and nuts shall be made of tinned copper material. The metal portion of the internal HV & LV bushing inside the tank shall remain dipped in oil in all operating condition. IS to be followed: IS 3347(Part-I) and IS 7421(latest amendment of IS). The LV bushings shall be provided on the sideways along with cable box. LT bushing to be rated for 1.1K V. 	11kV	12kV	250A	22kV	24kV	250A						
11kV	12kV	250A												
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5.9

CABLE BOXES

1. All transformer ratings shall have HT & LT side cable box without any glands.
2. Cable boxes made up of Mild Steel with suitable handle and front cover shall be provided for both HV and LV side.
3. Water should not accumulate on cable boxes and proper slope shall be provided to ensure drainage of water.
4. Cable box protection should be IP 55.
5. HV and LV cable boxes shall be fixed on opposite sides on the tank with nuts and bolts (gasket placed in between them) in such a way that they can be completely removed whenever required.
6. Canopy shall be provided on all gasket joints covering each cable box. Canopy with extended top covers or bend in edges of covers overlapping gasket to protect gasket from rain and sunlight are accepted. On top cover edges with metallic lining also accepted.
7. Suitable cable clamping/cleating arrangements shall be provided to keep Cable straight and to support cables to avoid tension on bushings due to cable weight.
8. Non-magnetic Gland plates shall be provided for both HV and LV cable box drilled with suitable no. of holes required for installation (as mentioned below).
9. Gland plates shall be mounted separately with nut & bolt arrangement and gasket in between them.
10. Support for GI earth strip (65x10mm) shall be provided to avoid tension on secondary neutral bushing.
11. The size of the cable box cover should be moderate so that only 2 people is enough to lift it.
12. **1 KG Eco friendly Orange Silica Gel Breathers are to be provided in HV and LV cable box to avoid moisture ingress on cable terminations.**

HV CABLE BOX

13. One part of the HV box shall be fixed on transformer and other parts/ cover shall be removable for cable termination.
14. Mild Steel earthing clamps shall be provided in the HV box to earth the armour of HV cable.
15. For 11kV, 3 C X 300 sq.mm / 3 runs 1 C x 185 sq mm and for 22kV, 3C x 240sq.mm / 3 runs 1 C x 185 sq mm XLPE Cable shall be used at HV side. HV box should be suitable for heat shrink of this cable. The distance between HV gland plate and HV bushings should be minimum 600 mm.
16. Standard Danger marking plate as per IS to be fixed on front of cover.
17. Earthing provision (Body earth) shall be provided in the HV box to earth the armour of HV cable.

LV CABLE BOX:

18. Neutral terminal of LV winding shall be brought out on LV phase terminals to form four wire system.
19. Epoxy Insulators shall be provided from top side in LV box to support LV busbar.
20. LV busbar shall be of AL material & shall have sufficient clearances between nut bolts with Lugs between each phases & phase and neutral.

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21. The no. and size of cables for installation on LV side shall be as follows:

Transformer Rating	Size of cable for Phase & Neutral	No. of runs
315 kVA	4C x 300 sq. mm (1.1 kV Class)	2
400 kVA		3
500 KVA		3
630 kVA		4
800 kVA		5
1 MVA		5
1.25MVA		7
1.6 MVA		8
2 MVA		10

5.10

TERMINAL CONNECTORS**HT TERMINAL CONNECTOR:**

- All ratings shall be suitable for 3CX300 sq.mm XLPE shall be provided at HT side for cable connection.
- Tinned Copper busbar of 100mm long with 50mmx6mm Size: The tinned copper busbar to be provided on HV cable box one size shall fixed in bushing stud with tinned brass bolts and washers. Other side should have hole with M16 bolts for fixing of Lug.

LT TERMINAL CONNECTOR:

- Tinned Brass palm connector (with suitable current rating), suitable bimetallic washer (between palm connector and Aluminum Busbar) and Aluminum busbar (current density: not more than 1 A/mm²) shall be provided.

5.11

CURRENT TRANSFORMERS

Only protection class Neutral CT to be provided as mentioned below:

Neutral Current transformer: All transformer shall be supplied with LT side neutral CT before bifurcation of neutral for earthing. The Neutral CTs shall be window type, resin cast, protection class having ratio & knee voltage as per following table. Current transformer shall be mounted outside the tank with suitable clamping arrangement and should be C-shaped of sliding, soft material, non-screw type. The current transformer shall comply with IS 2705. The terminals shall not have shorting facility. The CTs shall have following parameters. CT terminal box for secondary of CT shall be provided of suitable size on the side of transformer. Box shall have droppable terminal blocks with shorting link.

Parameter	Neutral CT
Accuracy class	5P20
Burden	15 VA
Application	Earth fault protection
Transformer rating	CT Ratio & knee point
500 KVA	1000/5 & min 60 V
630 KVA	1000/5 & min 60 V
800 KVA	1250/5 & min 60 V
1000 KVA	1500/5 & min 80 V
1250 KVA	2000/5 & min 100 V
1600 KVA	2500/5 & min 100 V

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Ketan S. Jadhav

Xx/xx/23


Ajay V. Potdar

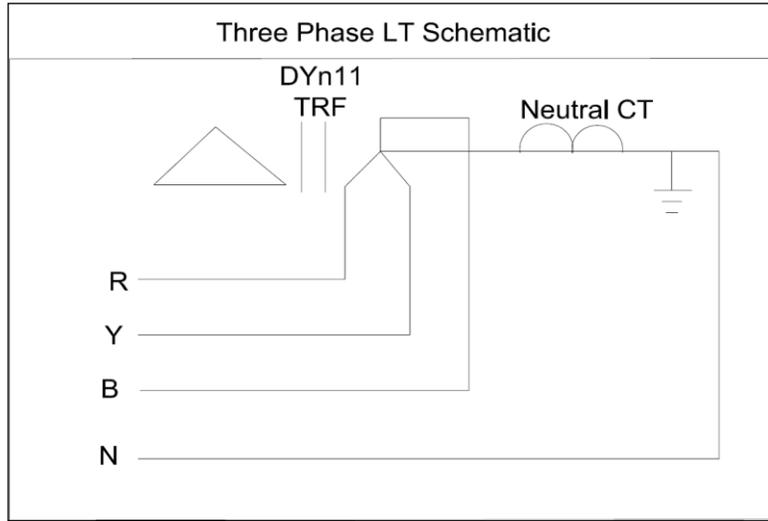
Xx/xx23

Ravindra M. Bhanage

Xx/xx/23

2000 KVA

3000/5 & min 130 V



5.13

EARTHING CONNECTIONS

NEUTRAL EARTHING:

1. Separate LV neutral bushing to be provided on top of LV box for neutral earthing.
2. The for connecting LV neutral bushing shall be provided with 2 No's of 65x10 mm GI strip (The thickness of GI coating of neutral earthing strip shall be 60 microns (minimum)).
3. At the bottom of the GI strips two concentric holes of 12 mm diameter shall be made and suitable nuts & bolts shall be provided for them.

BODY EARTHING:

4. Two body earthing terminals, located on the lower side of the transformer, diagonally opposite to each other of M12 size (taken 50mm out of tank) shall be provided on Transformer tank with Bolt.

5.14

**EQUILISING/
EQUIPOTENTIAL STRIP**

1. The Transformer top cover shall be connected at two places (diagonally opposite with each other) with the tank by **tinned copper strip (30mm wide, 0.7mm thick)**.
2. The strip should touch bare surface of tank to ensure proper electrical connection of tank body with top cover with the strip.

5.15

OIL

1. All transformers shall be filled with new, unused, clean, standard mineral oil in compliance with IS 335/ IEC 296 and shall be free from all traces of polychlorinated biphenyl (PCB) compounds. The use of recycled oil is not acceptable.
2. Oil shall be filled under vacuum before filling it shall be filtered and tested (as per IS 6103). The test parameters should be as per the table below:

Test parameters	Values
Break Down Voltage (min)	60 kV
Water content ppm, (max.)	20 ppm
Specific resistance (min.) (at 27°C)	2.5 × 10 ¹² ohm-cm

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The Tata Power Company Ltd				TECHNICAL SPECIFICATION FOR 11kV/415V & 22kV/415V OIL FILLED DISTRIBUTION TRANSFORMER
ENSE-DS-2008-R0				Date of Issue: 04/08/2023
5.16	CONSERVATOR	<p>1. The conservator shall be supported / fixed on the main body of the transformer tank.</p> <p>2. The capacity of the conservator tank shall be designed keeping in view the total quantity of oil and its contraction and expansion due to temperature variations. The total volume of conservator shall be such as to contain 10% quantity of the oil used in transformer. Normally, at least 30% volume of conservator shall be filled with Oil.</p> <p>3. The connecting pipe of the conservator shall be so fitted to transformer tank that the pipe can be detached from the tank.</p> <p>4. Joint less pipe shall be used which shall be connected with round flanges.</p> <p>5. The inside diameter of the pipe connecting the conservator to the main tank shall be within 25 to 50 mm and it should be projected into the conservator so that its end is approximately 20mm above the bottom of the conservator so as to create a sump for collection of impurities. The minimum oil level corresponding to -5°C should be above the sump level.</p> <p>6. The conservator oil filling cap/hole shall be of 32mm diameter & female type cap to be provided.</p> <p>7. 1MVA & above rating to be fixed with Buchholz relay between main tank and conservator. There shall be isolation valves on either side of Buchholz relay to replace the same in case of any abnormality after site installation.</p> <p>8. Buchholz relay the pipe should not contain any right-angle elbows. Its diameter should correspond to the diameter of the hole for the passage of oil of the relay. The pipe must be arranged to slope upwards towards the conservator at an angle of about 2 to 4 degrees to the horizontal (max 5 degrees). The part of the pipe preceding the relay should be straight for a length equal to at least five pipe diameters; the part of the pipe leading to the conservator immediately adjacent to the relay should be straight for a length equal to at least three pipe diameters.</p> <p>9. The Oil conservator shall be provided with:</p> <ul style="list-style-type: none"> • Oil level indicator (as per clause no. 5.17). • Dehydrating breather (as per clause no 5.22) • Drain plug and Oil filling hole (1.25 inch/32mm with thread size of BSP 1.25inch, 11TPI) with cover. • Detachable end plate on one side (the side on which the gauge glass is fitted), to enable the maintenance staff to periodically clean the inside of the conservator tank. <p>A rain shed should be provided on top portion of gasket joint.</p>		
5.17	OIL LEVEL INDICATOR	<p>1. Oil level indicator with prismatic glass and red colour background shall be provided. The oil gauge glass shall be removable and so embodied in the end plate to prevent oil leakage. Prismatic glass shall be polycarbonate material.</p> <p>2. The Oil level indicator should indicate oil level at minimum, normal and maximum as -5°C, 30°C and 90°C respectively.</p>		
5.18	Center of Gravity	<p>The transformer should be designed in such a way that the centre of gravity of complete transformer with oil and with all accessories shall fall at the vertical centre at lower height such that the transformer should be stable on flat surface ground and while lifting at lifting hooks.</p>		
5.19	EXPLOSION VENT / PRESSURE RELEASE DEVICE	<p>1. Explosion vent shall be provided on the top cover.</p> <p>2. Double diaphragm with oil observation gauge (prismatic Type) shall be provided on explosion vent pipe.</p> <p>3. All rating shall have PRV/PRD.</p> <p>4. PRV shall be provided to operate before reaching the test pressure as specified in the above class.</p> <p>5. PRV shall not have air release arrangement.</p>		

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		6. The PRV shall seal-off after the excess pressure has been released and it shall have mechanical flag arrangement. 7. The PRV shall have NO, NC contacts. 8. Canopy to be provided over PRD.				
5.20	AIR RELEASE PLUG	The cover of the main tank shall be provided with an air release plug on all ratings.				
5.21	DRAIN VALVE AND FILTER VALVE	1. The drain valve and filter valve shall be of Brass with gate valve. 2. The drain valve and filter valve shall have double round flanges. One side shall be fixed with tank and other side should be left open for oil filling/filtration purpose. 3. The drain valve and filter valve shall be provided with embossed name plate stating drain valve and filter valve. 4. The drain valve shall be located on the bottom and filter valve shall be provided at side top of tank. 5. Locking arrangement shall be provided to stop movement of hand wheel. 6. The valves shall be covered with a MS box by welding on tank.				
5.22	DEHYDRATING BREATHER	1. The breather pipe shall enter the conservator from the upper side of the conservator. 2. The breather shall contain Eco friendly orange silica gel of 1 KG upto 630 KVA, 2 KG >630 KVA upto 1000 KVA & 3 KG for 1250 KVA upto 2000 KVA. 3. The silica gel shall be eco-friendly orange colored as per IS: 3401 – 1992. It should be 3-4 Mesh size. 4. The body of the breather shall be transparent UV protected seamless acrylic tube. 5. The top cover shall be of die cast aluminum and powder coated or polyurethane painted. 6. The oil cup shall be of UV protected acrylic or polycarbonate. 7. Oil cup shall have marking of oil filling. 8. Oil cup shall be removable from bottom only without opening breather top cover assembly. Lock shall be provided to achieve the same. 9. Oil cup shall have metallic nut casted in body for fixing in central bolt.				
5.22	OIL TEMPERATURE INDICATOR	1. Dial Type Oil temperature indicator shall be provided for the transformer. It should be suitable for outdoor mounting with maximum indicator pointer. Fixing union shall be of female thread. 2. Dial size : 100 mm (dial should be made up of stainless steel) 3. Range: 0- 120 °C, Accuracy: ± 2 °C. 4. The OTI to be placed in marshalling box & It should have alarm and trip contacts at predetermined temperatures. 5. All rating shall have OTI with alarm & trip contacts and to be placed in marshalling box.				
5.23	FASTENERS	1. All the bolts or studs shall be at least 6 mm in diameter except when used for small wiring terminals. 2. All nuts/bolts/washers exposed to atmosphere shall be as follows: <table border="1" data-bbox="496 1486 1336 1583"> <tr> <td>Size 12mm (or below)</td> <td>Stainless Steel</td> </tr> <tr> <td>Above 12mm</td> <td>Steel with antirust coating ,Hot dip galvanized (80 microns thickness)</td> </tr> </table> 3. All ferrous bolts, nuts and washers placed in outdoor positions shall be hot dip galvanized to prevent corrosion (except high tensile steel bolts and spring washers which shall have electrolytic action between dissimilar metals). In case the galvanization is removed due to welding or manufacturing, the parts should be properly cleaned and painted to avoid exposure to atmosphere. 4. Each bolt shall project at least one thread but more than three threads through the nut. If bolts and nuts are placed so that they are inaccessible by means of ordinary spanners,	Size 12mm (or below)	Stainless Steel	Above 12mm	Steel with antirust coating ,Hot dip galvanized (80 microns thickness)
Size 12mm (or below)	Stainless Steel					
Above 12mm	Steel with antirust coating ,Hot dip galvanized (80 microns thickness)					

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		special spanners shall be provided. The length of the screwed portion of the bolts shall be such that no screw thread may form part of a shear plane between members. 5. Taper washers shall be provided where necessary. Protective washers of suitable material shall be provided on front and back of the securing screws.																														
5.24	SURFACE PREPARATION AND PAINTING	<ol style="list-style-type: none"> The paint shall be applied by airless spray. Steel surfaces shall be prepared by shot blast cleaning (IS-9954) to grade Sq.2.5 of ISO 8501-1 or chemical cleaning including phosphating of the appropriate quality (IS 3618). Heat resistant (Hot oil proof) paint shall be used for the inside surface and whereas for external surface one coat of thermosetting powder paint or one coat of epoxy primer (zinc chromate) followed by two coats of polyurethane (P.U.) base paint. as per table given below: <table border="1" data-bbox="483 575 1458 865"> <thead> <tr> <th>Sr. No.</th> <th>Paint type (should be UV restraint, non-fading)</th> <th>Area to be painted</th> <th>No of coats</th> <th>Total dry film thickness (min); micron</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Thermosetting powder paint</td> <td>Inside Outside</td> <td>01 01</td> <td>30 60</td> </tr> <tr> <td>2.</td> <td>Liquid Paint</td> <td></td> <td></td> <td></td> </tr> <tr> <td>a.</td> <td>Epoxy (primer)</td> <td>Outside</td> <td>01</td> <td>30</td> </tr> <tr> <td>b.</td> <td>P.U. Paint (finish paint)</td> <td>Outside</td> <td>02</td> <td>25 (each)</td> </tr> <tr> <td>c.</td> <td>Hot oil resistant paint</td> <td>Inside</td> <td>01</td> <td>35</td> </tr> </tbody> </table> <p>The two coats shall be of oil and weather-resistant nature with final coat as glossy and non-fading paint of shade 631 as per IS 5 or RAL 7032.</p> The dry film thickness shall not exceed the specified minimum dry film thickness by more than 25%. Any damaged part shall be cleaned to bare metal with an area extending 25 mm around its boundary. A priming coat shall be immediately applied followed by full paint finish equal to that originally applied and extending 50 mm around the perimeter of the original damage. The repainted surface shall present a smooth surface which shall be obtained by carefully chamfering the paint edges before and after priming. Painting shall not be affected by weather changes & performance against pilling out or fading etc. to be guaranteed for 5 Years. 	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 Outside	01 01	30 60	2.	Liquid Paint				a.	Epoxy (primer)	Outside	01	30	b.	P.U. Paint (finish paint)	Outside	02	25 (each)	c.	Hot oil resistant paint	Inside	01	35
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5.25	RADIO INTERFERENCE	When operated at voltages up to 12.5% in excess of the normal system rating, transformers shall be substantially free from partial discharges (i.e. corona discharges in either internal or external insulation) which are likely to cause interference with radio or telephone communication.																														
5.26	OVERLOAD CAPACITY	The transformer shall be suitable for loading as per IEC 60076 / IS 2026 Part-7 & 8																														
5.27	PACKING	<ol style="list-style-type: none"> Transformers shall be delivered filled with oil and supplied with all accessories mounted. Screws and bolts shall be thoroughly tightened to ensure no leakage of oil. Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner to protect the equipment from damage in transit. No single use plastic to be used in packing material. Packing should be done with environment friendly recyclable materials. 																														
5.28	FITTINGS	The following standard fittings shall be provided: <ol style="list-style-type: none"> Two earthing terminals with earthing symbol \perp for body earthing. Air Release Device. Thermometer Pocket with cap. Inspection Cover. Drain cum Sampling Valve (Double Flanged) and (0.75 inch nominal size thread, IS 554) with locking arrangement and a valve cover made of M.S.steel. 																														

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		<ol style="list-style-type: none"> 6. Non Return Valve. 7. Pressure relief device or explosion vent. 8. Radiators. 9. HV and LV cable Boxes. 10. HV and LV Bushings. 11. Terminal Connectors for HV/LV side (palm connector, suitable bimetallic washer, Al busbar and Al lugs). 12. HV and LV Gland plates (Non-Magnetic) (with Brass glands for TPDDL, Delhi). 13. Conservator with Dehydrating Breather. 14. Prismatic Oil level Gauge. 15. Lifting lugs for the top cover, complete transformer as well as for core and winding assembly. 16. Pulling Lugs. 17. Jacking Pads. 18. Stiffener Angle. 19. 2 Base channels. 20. 4 No. Bidirectional rollers with locking arrangement. 21. Marking Plates as asked in clause 6.1 22. Magnetic Oil level Gauge, Oil Temperature indicator with alarm & trip, Magnetic Reed type Buchholz relay and Winding Temperature Indicator. 23. Marshalling Box with stud type terminals. 24. Two GI strip for neutral earthing with minimum GI coating thickness of 86 microns. Size of GI strip shall be, 65x10mm 25. MOG, PRD, Buchholz relay shall be provided with weather proof canopy to avoid any water seepage inside relay. 												
<p>5.29</p>	<p>WINDING TEMPERATURE INDICATOR (WTI)</p>	<ol style="list-style-type: none"> 1. WTI shall be provided in one winding of LV phase. 2. WTI 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. 3. WTI shall operate a remote alarm and trip in the event of attaining the predefined temperature. 4. In addition, pocket with heater coil along with Resistance Temperature Indicator (RTD) shall be provided for WTI and OTI. CT for RTD for winding hot spots shall be provided. 												
<p>5.30</p>	<p>BUCHHOLZ RELAY</p>	<ol style="list-style-type: none"> 1. Magnetic Reed type Buchholz relay shall be provided with alarm and tripping contacts to detect accumulation of gas. 2. The installation shall be fixed and weather proof to avoid any water seepage inside the relay. 3. Round flange of nominal pipe bore of 50mm diameter shall be used. 												
<p>5.31</p>	<p>MARSHALLING BOX AND PROTECTION</p>	<ol style="list-style-type: none"> 1. Marshalling Box of suitable size, made up of Mild Steel and with theft proof locking arrangement shall be provided. 2. Marshalling box shall have IP 55 protection. 3. Marshalling Box shall have provision for wiring the WTI, OTI, MOG, PRV, Buchholz relay and LT CT terminals. The terminals shall be provided as per table below. For TPC Mumbai, standard TB links along with terminal markings will be provided separately at the time of drawing approval stage. <table border="1" data-bbox="495 1612 1437 1793"> <thead> <tr> <th>Element</th> <th>Alarm</th> <th>Trip</th> </tr> </thead> <tbody> <tr> <td>Oil Temperature Indicator</td> <td>NO,NC,COM</td> <td>NO,NC,COM</td> </tr> <tr> <td>Winding Temperature Indicator HT Side</td> <td>NO,NC,COM</td> <td>NO,NC,COM</td> </tr> <tr> <td>Winding Temperature Indicator LT Side</td> <td>NO,NC,COM</td> <td>NO,NC,COM</td> </tr> </tbody> </table>	Element	Alarm	Trip	Oil Temperature Indicator	NO,NC,COM	NO,NC,COM	Winding Temperature Indicator HT Side	NO,NC,COM	NO,NC,COM	Winding Temperature Indicator LT Side	NO,NC,COM	NO,NC,COM
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<p>5.32</p>	<p>MAKE OF MAJOR COMPONENTS & RAW MATERIALS</p>	<p>The BA shall procure the following constituent items from the designated vendors as follows:</p> <table border="1"> <thead> <tr> <th>Sr.no</th> <th>RAW MATERIAL/EQUIPMENT</th> <th>MAKE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Transformer Raw Materials</td> <td></td> </tr> <tr> <td>a)</td> <td>Copper</td> <td>M/S Sterlite, M/S Hindustan Copper, M/S Hindalco or equivalent on approval of bidder.</td> </tr> <tr> <td>b)</td> <td>Core</td> <td>M/S AK Steels, POSCO, Kawasaki/ JFE, Nippon Steel or equivalent on approval of bidder.</td> </tr> <tr> <td>c)</td> <td>Insulation paper</td> <td>Raman Boards- Mysore, Senapathy Whiteley – Bangalore or equivalent on approval of bidder.</td> </tr> <tr> <td>d)</td> <td>Transformer Oil</td> <td>Savita, Apar, Gandhar or equivalent on approval of bidder.</td> </tr> <tr> <td>e)</td> <td>Gaskets & Corks</td> <td>Nu Cork, Anchor Corks or equivalent on approval of bidder.</td> </tr> <tr> <td>f)</td> <td>Steel For Tank</td> <td>M/S TISCO, M/S SAIL, M/S Bhushan Steel, M/S ISSCO, M/S RINL, M/S Jindal Steel or equivalent on approval of bidder.</td> </tr> </tbody> </table> <p>Bidder has to provide all test certificates from original manufacturers & relevant sourcing documents. BA shall also have shot blasting facility.</p>	Sr.no	RAW MATERIAL/EQUIPMENT	MAKE	1	Transformer Raw Materials		a)	Copper	M/S Sterlite, M/S Hindustan Copper, M/S Hindalco or equivalent on approval of bidder.	b)	Core	M/S AK Steels, POSCO, Kawasaki/ JFE, Nippon Steel or equivalent on approval of bidder.	c)	Insulation paper	Raman Boards- Mysore, Senapathy Whiteley – Bangalore or equivalent on approval of bidder.	d)	Transformer Oil	Savita, Apar, Gandhar or equivalent on approval of bidder.	e)	Gaskets & Corks	Nu Cork, Anchor Corks or equivalent on approval of bidder.	f)	Steel For Tank	M/S TISCO, M/S SAIL, M/S Bhushan Steel, M/S ISSCO, M/S RINL, M/S Jindal Steel or equivalent on approval of bidder.
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<p>5.33</p>	<p>INSULATING PAPER AND INSULATING PRESSBOARD</p>	<ol style="list-style-type: none"> Inter layer insulation both for HV and LV windings shall be Epoxy diamond dotted Kraft paper and compressed pressboard of make (refer Clause no.5.32) subject to approval of TPC. Primary and secondary windings shall be constructed from high-conductivity (copper conductors), Double Paper Covered (DPC) copper conductor with min. 30% overlap per layer of paper & TPC with 25% overlap per layer. 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 																								

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- be present.
3. Kraft paper and Pressboard should be of class A (105°C) insulation material.
 4. All spacers, axial wedges / runners used in windings shall be made of pre-compressed solid pressboard.
 5. All axial wedges/runners shall be properly milled to dovetail shape so that they pass through the designed spacers freely.
 6. 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.
 7. 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.
 8. Below required values could be verified if required at any stage of the inspection and it should fulfill the requirement as per below table:

Characteristics	Kraft Paper	Pressboard (all Sizes)
1. Dimension	As specified by bidder with $\pm 5\%$ tolerance.	As specified by bidder with tolerance as per IS1576.
2. Apparent Density	>0.80 g/cm ³	as per IS 1576 w.r.t Thickness
3. pH of Aqueous extract	6-8%	6-8%
4. Electrical strength i) in air ii) In Oil	7KV/mm -----	12KV/mm 35KV/mm
5. Ash content	Maximum 1%	Maximum 0.7
6. Moisture content	Maximum 8%	Maximum 8%
7. Oil absorption	-----	Minimum 9%
8. Heat stability	As per IS 9335-part 3	As per IS 1576
9. Tear index	As per IS 9335-part 3	As per IS 1576

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 plies 1.
8. Elongation
9. Air permeability

Bidder shall provide the below details in below table

Sr. No.	Description	Unit	As furnished by bidder
1	DPC Paper for HV and LV conductor.		
	Type of DPC Paper		
	Make of DPC Paper		

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		Thickness DPC Paper	mm	
		Percentage Overlapping (not less than 60%)	%	
2		Type of paper for interlayer insulation		
		Make of paper for interlayer insulation		
		Thickness of Paper for Interlayer Insulation	mm	
3		Type of Paper for Insulation Between HV and LV winding		
		Make of Paper for Insulation Between HV and LV winding		
		Thickness of Paper for Insulation Between HV and LV winding (for all sizes)	mm	
4		Type of Pressboards used for Insulation Between HV and LV winding		
		Make of Pressboards used for Insulation Between HV and LV winding		
		Thickness of Pressboards for Insulation Between HV and LV (all size)	mm	
5		Type of Paper used for insulation between core and LV		
		Make of Paper used for insulation between core and LV		
		Thickness of Paper used for insulation between core and LV (All sizes)	mm	
6		Type of Pressboard used for insulation between core and LV		
		Make of Pressboard used for insulation between core and LV		
		Thickness of Pressboard used for insulation between core and LV (All sizes)	mm	
7		Material used for top and bottom yoke insulation		
		Make of material used for top and bottom yoke insulation		
		Thickness of material used for top and bottom yoke insulation	mm	
8		Type of material used for spanner, wedge, and Axial for insulation.		
		Thickness of material used for spanner, wedge, and Axial for insulation.	mm	

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6.0 NAME PLATE AND MARKING

6.1 MARKING PLATES

1. **Name Plate (Rating) Plate :**
A rating plate shall be fitted to each transformer in a visible position and shall carry all the information as **specified in clause no. 6.2**
2. **Terminal Marking Plate :**
 - The terminal marking plate shall be provided which shall be strictly in accordance with **figure 4 of IS 1180-Part 1: 2014**. This plate may be combined with the rating plate or can be provided separately.
 - Value of short circuit impedance on extreme tapping and on principal tapping and indication of winding to which impedance is related has to be displayed additionally.
3. **Details Plate:**
A separate plate of **size 125 mm x 125 mm** shall be provided having following details:
 - Name of the firm.
 - Serial No.
 - Rating of transformer.
 - Order no. and date.
 - Date of dispatch.
4. **Guarantee Plate:**
A separate warranty plate made of **Stainless Steel** with following clause written on it.

“THE EQUIPMENT GUARANTEED UPTO A PERIOD OF 48 MONTHS FROM THE DATE OF COMMISSIONING OR 60 MONTHS FROM THE DATE OF LAST SUPPLY”

All the plates described above (clause 1 to 4) should be as followings:

Material	Stainless Steel
Thickness	1 mm
Engraving	The letters on the rating plate shall be engraved black on the white/silver back ground.
Fixing	Fixing screws shall be of stainless steel.
5. **Danger Plate:**
Danger notice shall have red lettering on a white background on a plate as specified in **IS: 2551 – 1982**.
6. **BIS Certification Mark:**
The Bidder is required to get approval from BIS and display BIS mark on the name plate.
7. **BEE LABEL:**
A label shall be affixed on the front of the distribution transformer near the name plate, so as to be prominently visible. The label shall be non-detachable weather proof type with the following particulars shall be displayed on its label, namely:
 1. the logo of the Bureau of Energy Efficiency
 2. that the equipment is a distribution transformer
 3. that it is an oil filled, naturally cooled type
 4. name of the manufacturer and brand
 5. Capacity in KVA as tested

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6. Voltage is up to 11 KV
7. Total losses at 50% loading in watts
8. Total losses at 100% loading in watts
9. Star level
10. Model and year of manufacturing.
11. Bureau's authorisation number

8. Control Circuit drawing Plates:

- Engraved drawing for control circuit unit shall be available on Marshalling box.

The design, colour, size and content of label shall be as specified in the schedule annexure IV.

Logo Size – 300mm X 300mm.

Relationship between the two marks- size

The Tata and Tata Power Marks are always used in conjunction with each other, never appearing in isolation on Tata Power communication.

The height of the letter T of Tata (T-height) is the basic measure for all sizes and proportions.

The rounded measure 2T in height, is separated from the Tata lettering by a distance of 1/2T.

The T height of both, the Tata and the Tata Power Marks is to be the same, except in exceptional cases on approval from the Corporate Communications team.



Centre aligned - Stacked (Preferred)

Relationship between the two marks- positioning

The two marks can appear stacked, which is the preferred placement, or linear, by the side of one another.



6.2

NAME PLATE DETAILS

The name plate shall be strictly as per **IS 1180: 2014 (figure 1)**. Additionally, following points shall be displayed :

1. Actual no load losses of transformer.
2. Actual total losses of transformer at 50% load and 100% load.
3. Standard mark (BIS certification).

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		4. For Tata Power, Mumbai - " PROPERTY OF Tata Power Company " shall be written in bold letters. 5. PO number with date has to be mentioned. 6. Overall dimensions of the transformer.		
6.3	MARKING	1. All transformers shall have HV phase windings marked in both, the terminal boards inside the tank and outside with capital letter 1U, 1V, 1W. The LV winding for the same phase shall be marked by corresponding small letter 2u, 2v, 2w. The neutral point terminal shall be indicated by the letter 2n. 2. The markings shall be done by steel strips in which marks had been engraved in black colour. 3. Colour marking of the bushings shall be done. 4. On the top cover of tank and the core channel, Manufacturer's name and Manufacturer's serial no. shall be engraved.		
7.0	TESTS	All routine, acceptance & type tests shall be carried out in accordance with the IS 2026 and IS 1180: Part-1 (2014). All routine & type tests shall be witnessed by the TATA POWER/his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted on the Distribution Transformers in addition to others specified in IS/IEC standards.		
7.1	TYPE TEST	1. Lightning Impulse Test [As per IS 2026 (Part 3)]. 2. Temperature Rise Test [As per IS 2026 (Part 2)]. NOTE: Maximum measured total loss (No load at Rated excitation load loss at maximum current tap converted to 75°C reference temperature) at 100 percent loading shall be supplied during temperature rise test. 3. Short Circuit Withstand test [As per IS 2026 (Part 5)]. NOTE: Routine tests before and after short circuit test shall be conducted as per IS 2026(Part 1). 4. Pressure Test [As per IS 1180: Part 1 (2014)]. Note: - Out of the above mention type test, the tests under sr. no. 1, 2, and 3 shall be conducted at CPRI/ERDA labs and the balance test shall be acceptable as in- house tests.		
7.2	ROUTINE TEST	1. Measurement of Winding Resistance at each tap [As per IS 2026 (Part 1)]. 2. Measurement of voltage ratio, check of voltage displacement, polarity, phase sequence and vector group [As per IS 2026 (Part 1)]. 3. Measurement of short circuit impedance (principal tapping, when applicable) and load loss at 50% and 100% load [As per IS 2026 (Part 1)]. 4. Measurement of insulation resistance [As per IS 2026 (Part 1)]. 5. Induced over voltage withstand test [As per IS 2026 (Part 3)]. 6. Separate Source voltage withstand test [As per IS 2026 (Part 3)]. 7. Pressure test [As per IS 1180: Part 1] 8. Oil leakage test [As per IS 1180: Part 1] 9. Measurement of no load losses and magnetizing current at rated frequency and 90%, 100% and 112.5% of rated voltage. [As per IS 2026 (Part 1)]. 10. Vacuum withstand test on tanks and radiators. 11. All CT's and resistance of image coil for WTI shall be checked for ratio test, polarity and knee point voltage. 12. Oil sample Test (as per IS 335).		
7.3	ACCEPTANCE TEST	a. Temperature Rise Test (on one unit of every lot offered for inspection for each rating). b. Oil leakage test [As per IS 1180: Part 1] c. The painted surface shall pass the Cross Adhesion Test, Impact Test and Hardness Test. d. Checking of weight, dimensions, fitting and accessories, tank sheet thickness, oil quantity, material finish and workmanship, physical verification of core coil assembly and		

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		<p>measurement of flux density on one unit of each rating of the offered lot with reference to the GTP and contract drawings.</p> <p>e. Vector group test</p> <p>f. Calibration of WTI and OTI.</p> <p>g. 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 TATA POWER's representative at the place of manufacture before dispatch without any extra charges. The testing shall be carried out in accordance with IS: 1180 and IS: 2026.</p> <p>h. Device Trails & tests for 1MVA & above (Buchholz trip, Buchholz alarm, PRV trip, WTI Alarm, WTI trip, OTI trip and OTI Alarm).</p> <p>i. Magnetic Balance Test on HV & LV side, with magnetizing current HV and LV side.</p>	
8.0	TYPE TEST CERTIFICATES	<p>The Bidder shall furnish the type test certificates of the 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 TATA POWER.</p>	
9.0	PRE-DESPATCH INSPECTION	<ol style="list-style-type: none"> Equipment shall be subject to inspection by a duly authorized representative of the TATA POWER. 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 always grant free access to the places of manufacture to TATA POWER's representatives when the work is in progress. Inspection by the TATA POWER 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 TATA POWER. following documents shall be sent along with material: <ol style="list-style-type: none"> Test reports MDCC issued by TATA POWER Invoice in duplicate Packing list Drawings & catalogue Guarantee / Warrantee card Delivery Challan. Other Documents (as applicable) 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 TATA POWER's representative. 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 TATA POWER. The bidder shall furnish following documents along with their offer in respect of the raw materials: <ol style="list-style-type: none"> Invoice of supplier. Mill's certificate Packing List. Bill of Landing Bill of entry certificate by custom. 	

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		<p>5. To ensure about the quality of transformers, the inspection shall be carried out by the TATA POWER's representative at following two stages:</p> <ol style="list-style-type: none"> 1. Online anytime during receipt of raw material and manufacture/assembly whenever the TATA POWER desires. 2. At finished stage i.e. transformers are fully assembled and are ready for dispatch. <p>6. The stage inspection shall be carried out as per Annexure-I.</p> <p>7. 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 TATA POWER 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. The inspection shall be done as per the format given in Annexure – II. During the inspection, the bidder shall also furnish the information regard various components as per Annexure – III.</p> <p>8. 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 TATA POWER at the earliest after receipt of offer for pre-delivery inspection.</p> <p>9. All tests and inspection shall be carried out at the place of manufacture unless otherwise specifically agreed upon by the manufacturer and TATA POWER at the time of purchase. The manufacturer shall offer the inspector representing the TATA POWER 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.</p> <p>10. The bidder shall provide all services to establish and maintain quality of workmanship in his works and that of his sub-contractors 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.</p> <p>11. The TATA POWER 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. TATA POWER 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 TATA POWER have every right to reject the entire lot or penalize the bidder, which may lead to blacklisting, among other things.</p> <p>12. TATA POWER also reserves the right to inspect the tank of transformer before surface preparation and painting. The same shall be informed to TATA POWER accordingly.</p>	
10.0	INSPECTION AFTER RECEIPT AT STORE	<ol style="list-style-type: none"> 1. The material received at the TATA POWER store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection. 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 TATA POWER. 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. 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. 5. TATA POWER 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. 6. TATA POWER 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 	

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		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 TATA POWER either at the manufacturer's works when they are offered in a lot for supply or randomly from the supplies already made to TATA POWER stores. The findings and conclusions of these tests shall be binding on the bidder.			
11.0	GUARANTEE:	<ol style="list-style-type: none"> 1. Bidder shall stand guarantee towards design, materials, workmanship & quality of process/manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract. 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. 2. Bidder shall be liable to undertake to replace/rectify such defects at his own costs within mutually agreed timeframe and to the entire satisfaction of the TATA POWER, failing which the TATA POWER will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the TATA POWER's own charges (@ 20% of expenses incurred), from the Bidder or from the "Security cum Performance Deposit" as the case may be. 3. In case of Distribution transformer fails within the guarantee period TATA POWER will immediately inform the Bidder who shall take back the failed Distribution 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. 4. 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. 			
12.0	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. No single use plastic to be used in packaging. The packaging material shall be environmentally friendly & recyclable.			
13.0	TENDER SAMPLE	NA			
14.0	QUALITY CONTROL	<p>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. TATA POWER's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.</p> <p>The following information shall necessarily be submitted with the bid:</p> <ol style="list-style-type: none"> 1. List of important raw materials, names of sub-suppliers for raw materials, standards to which raw material is tested and the copies of test reports of the tests carried out on raw materials in presence of Bidder's representatives. 2. List of manufacturing facilities available, level of automation achieved and the areas where manual process exists. 3. List of areas in manufacturing process where stage inspections are normally carried out for quality control and details of these tests and inspections 4. List of testing equipment for final testing with valid calibration reports. Manufacturer shall possess 0.1 class instruments for measurement of losses. 5. QAP withhold points for Tata Power inspection. 			
15.0	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.			

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16.0	MANUFACTURING ACTIVITIES	The successful bidder will have to submit GTP & Drawing with 15 days from placement of order/OLA for approval. The date of Code -2/ Code-1 approval given by TATA Power will be treated as first day for assessment of LD (if applicable).			
17.0	SPARES, ACCESSORIES AND TOOLS	<ol style="list-style-type: none"> 1. 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 part listed at the time of award of contract and these parts shall be supplied as a part of definite works. The Purchaser may order additional spares at any time during the contract period at the rates stated in the Contract document. 2. Bidder shall give an assurance that the reparability of transformer, 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. 3. 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 plant and must be suitably marked and numbered for identification. 			
18.0	DRAWINGS AND DOCUMENTS	<p>Following drawings and documents shall be prepared based on TATA POWER specifications and statutory requirements and shall be submitted with the bid:</p> <ol style="list-style-type: none"> 1. Completely filled in Technical Particulars (General Technical Particulars, General Technical Requirements, Additional Details, and Fittings as per clause 5.29). 2. Description of the transformer and all components including brochures. 3. General arrangement for Transformer. 4. Foundation plan. 5. Bill of material. 6. Experience List 7. Type test certificates. <p>Drawings / documents to be submitted after the award of the contract are as under:</p> <ol style="list-style-type: none"> 1. List of Drawings/Parameters to be submitted: <ol style="list-style-type: none"> 1. Technical Parameters as asked in Specification (General Technical Particulars, General Technical Requirements, Additional Details, Fittings, Type test Reports and Routine test certificates of bought out accessories). 2. General Arrangement Drawing of the Transformer (Front view, Top view and both sides view. Complete list of fittings to be displayed and quantities to be mentioned with the drawing). 3. Internal Core arrangement drawing. 4. Internal Core-coil assembly drawing. 5. Marking plates and Markings (as mentioned in clause 6) 6. Foundation Plan drawing. 7. HV and LV bushings drawing (with internal view and metal parts) 8. HT connector / LT connector (palm connector), Aluminium Busbar and Al lugs drawings. 9. HV and LV Box drawing. 10. Gland Plate for HV/LV box. 11. Conservator drawing. 12. Prismatic oil level gauge drawing. 13. Silica Gel Breather drawing. 14. CT Terminal Box drawing with internal wiring arrangement. 15. Gland plate of CT Terminal. 16. Test Certificates. 			

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17. Installation Instructions.
18. Transport/Shipping dimension drawing.
19. QA/QC plan.

2. **List of Calculations to be submitted:**

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

1. Resistance Calculation (75 deg. C)
2. Load Losses Calculation (at 75 deg. C)
3. No load Losses.
4. Stray Losses.
5. Weight of Copper (Bare and with Insulation also).
6. Weight of Core.
7. Flux Density calculations.
8. Current Density Calculations.
9. Short Circuit withstand.
10. Temperature Rise Calculations.
11. Conservator Volume calculations.
12. Cooling Calculations showing cooling with tank and radiators separately with no. of radiators and fins mentioned specifically.
13. Lifting lugs.

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

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

All the documents & drawings shall be in English language.

After the receipt of the order, the successful bidder will be required to furnish all relevant drawings/parameters/calculation to TATA POWER for approval.

Instruction Manuals:

Bidder shall furnish softcopies of nicely bound manuals (In English language) covering erection and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices.

19.0

GUARANTEED TECHNICAL PARTICULARS

Sr. No.	Description	Unit	As Specified by bidder	As Furnished by Bidder.
1	Continuous Rating	kVA	315/400/500/630/800/1000/1250/1600/2000	
2	Type of Transformer		Conventional	
3	Name of Manufacturer		To be furnished by Bidder	
4	Place of Manufacture		To be furnished by Bidder	

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5	Voltage ratio	kV	11/0.415 or 22/0.415 or 6.6/0.415	
6	Vector group		Dyn-11	
7	Type of cooling		ONAN	
8	Class of Insulation		Class A	
9	Winding Material		Copper	
10	Core material used and Grade			
10.1	Thickness		To be furnished by Bidder	
10.2	Grade		M3 or better	
10.3	Flux Density at normal voltage	Tesla	1.69 T	
10.4	Overfluxing without saturation	Tesla	1.9 T	
11	Maximum temperature rise of:			
11.1	Windings by resistance method	Deg. C	45° C	
11.2	Oil by thermometer	Deg. C	40° C	
12	Magnetizing (no-load) current at:			
12.1	90% Voltage	%	To be furnished by Bidder	
12.2	100% Voltage	%	To be furnished by Bidder	
12.3	112.5% Voltage	%	To be furnished by Bidder	
13	Resistance of windings at 20 deg. C			
13.1	HV windings	Ohms/phase	To be furnished by Bidder	
13.2	LV windings	Ohms/phase	To be furnished by Bidder	
14	No Load losses	Watts	To be furnished by Bidder	
15	Load losses at 50% loading at 75° C	Watts	To be furnished by Bidder	
16	Load losses at 100% loading at 75° C	Watts	To be furnished by Bidder	
17	Total losses at 100% load at 75° C	Watts	To be furnished by Bidder	
18	Total losses at 50% load at 75° C	Watts	To be furnished by Bidder	
19	Current density used for:			
19.1	HV winding	Amp./mm ²	< or = 2.5	
19.2	LV winding	Amp./mm ²	< or = 2.5	
20	Clearances			
20.1	Core and LV	mm	To be furnished by Bidder	
20.2	LV and HV	mm	To be furnished by Bidder	
20.3	HV Phase to phase	mm	To be furnished by Bidder	
20.4	Between HV winding and Yoke	mm	To be furnished by Bidder	
20.5	Between LV winding and Yoke	mm	To be furnished by Bidder	
20.6	Between yoke and inside of tank to cover	mm	To be furnished by Bidder	
20.7	Between yoke and bottom	mm	To be furnished by Bidder	
20.8	Any point of winding to tank	mm	To be furnished by Bidder	
21	Efficiency at 75 deg. C			
21.1	Unity P.F.			
	125% load	%	To be furnished by Bidder	

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	100% load	%	To be furnished by Bidder	
	75% load	%	To be furnished by Bidder	
	50% load	%	To be furnished by Bidder	
	25% load	%	To be furnished by Bidder	
21.2	0.8 P.F.			
	125% load	%	To be furnished by Bidder	
	100% load	%	To be furnished by Bidder	
	75% load	%	To be furnished by Bidder	
	50% load	%	To be furnished by Bidder	
	25% load	%	To be furnished by Bidder	
22	Regulation at :			
22.1	Unity P.F. at 75 deg. C	%	To be furnished by Bidder	
22.2	0.8 P.F. at 75 deg. C	%	To be furnished by Bidder	
23	% Impedance at 75 deg. C	%	To be furnished by Bidder	
24	Power frequency voltage withstand test			
24.1	HV for 1 minute	kV	28 (for 11kV) 50 (for 22kV) 20 (for 6.6kV)	
24.2	LV for 1 minute	kV	3	
25	Over potential Test (Double voltage and double frequency for 1 minute)	V	830	
26	Impulse voltage withstand test (HV)	kVp	75 (for 11kV) 125 (for 22kV) 60 (for 6.6kV)	
27	Mass of :			
27.1	Core lamination (minimum)	kg	To be furnished by Bidder	
27.2	Windings (minimum)	kg	To be furnished by Bidder	
27.3	Tank and fittings	kg	To be furnished by Bidder	
27.4	Oil	kg	To be furnished by Bidder	
27.5	Oil quantity (minimum)	Ltr	To be furnished by Bidder	
27.6	Total weight	kg	To be furnished by Bidder	
28	Oil Data:			
28.1	Quantity for first filling (minimum)	Ltr	To be furnished by Bidder	
28.2	Grade of oil used		To be furnished by Bidder	
28.3	Marker's name		To be furnished by Bidder	
28.4	BDV at the time of filling	kV	To be furnished by Bidder	
29	Transformer:			
29.1	Overall length × Breadth × Height	mm X mm X mm	To be furnished by Bidder	
29.2	Tank length × breadth × height	mm X mm X mm	To be furnished by Bidder	
29.3	Thickness of plates for			
29.3.1	Side plate (min.)	mm	5	
29.3.2	Top and bottom Plate (min.)	mm	6	
30	Conservator:			

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	30.1	Tank diameter*height	mm*mm	To be furnished by Bidder	
	30.2	Volume of oil in conservator	Liters	To be furnished by Bidder	
	31	Radiators:			
	31.1	Heat dissipation by tank walls excluding top and bottom		To be furnished by Bidder	
	31.2	Heat dissipation by cooling Radiator		To be furnished by Bidder	
	31.3	Size and thickness of sheet		To be furnished by Bidder	
	31.4	No of bank/fins		To be furnished by Bidder	
	32	Inter layer insulation provided in design for In between all layer		To be furnished by Bidder	
	33	Insulation materials provided			
	33.1	For conductors			
	33.1.1	HV		To be furnished by Bidder	
	33.1.2	LV		To be furnished by Bidder	
	33.1.3	Core		To be furnished by Bidder	
	34	Material and size of the wire used			
	34.1	HV Conductor			
	34.1.1	Size	mm	To be furnished by Bidder	
	34.1.2	Area of cross section	Sq.mm	To be furnished by Bidder	
	34.2	LV Conductor			
	34.2.1	Strip size	mm	To be furnished by Bidder	
	34.2.2	No. of conductors in parallel	Nos.	To be furnished by Bidder	
	34.2.3	Total area of cross section	Sq.mm	To be furnished by Bidder	
	35	Whether the name plate gives all particulars as required in specifications	YES/NO	To be furnished by Bidder	
	36	Particulars of bushings HV			
	36.1	Manufacturer's name		To be furnished by Bidder	
	36.2	Compliance to standard IS 8603		To be furnished by Bidder	
	36.3	Rating as per IS		To be furnished by Bidder	
	36.4	Dry power frequency voltage withstand test		To be furnished by Bidder	
	36.5	Wet power frequency voltage withstand test		To be furnished by Bidder	
	37	Particulars of bushings LV			
	37.1	Manufacturer's name		To be furnished by Bidder	
	37.2	Compliance to standard IS-3347		To be furnished by Bidder	
	37.3	Rating as per IS		To be furnished by Bidder	
	37.4	Dry power frequency voltage withstand test		To be furnished by Bidder	
	37.5	Wet power frequency voltage withstand test		To be furnished by Bidder	
	38	Whether the offer conforms to the limits of impedance mentioned in specification		To be furnished by Bidder	

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39	Whether the offer conforms the limits of temperature rise mentioned in specification		To be furnished by Bidder	
40	Whether the losses of transformers offered are within the limits specified		To be furnished by Bidder	
41	Whether the transformer offered is already type tested for design and test reports enclosed		To be furnished by Bidder	

ADDITIONAL DETAILS:

Sl. No.	Description	Unit	As Specified by TPCL	As furnished by bidder
1	Core grade		M3 or Better	
2	Thickness of core	mm	To be furnished by Bidder	
3	Core diameter	mm	To be furnished by Bidder	
4	Gross core area	Sq.cm	To be furnished by Bidder	
5	Net core area	Sq.cm	To be furnished by Bidder	
6	Flux density (calculated)	Tesla	To be furnished by Bidder	
7	Mass of core	Kg	To be furnished by Bidder	
8	Loss per Kg of core at the above specified flux density	Watt	To be furnished by Bidder	
9	Core window height	mm	To be furnished by Bidder	
10	Center to center distance of the core	mm	To be furnished by Bidder	
11	No. of LV Turns		To be furnished by Bidder	
12	No. of HV Turns		To be furnished by Bidder	
13	Size of LV conductor bare/covered	mm	To be furnished by Bidder	
14	No. of parallels		To be furnished by Bidder	
15	Size of HV conductor bare/covered	mm	To be furnished by Bidder	
16	Current density of LV winding(calculated)	A/sq.mm	To be furnished by Bidder	
17	Current density of HV winding(calculated)	A/sq.mm	To be furnished by Bidder	
18	Wt. of the LV winding	Kg	To be furnished by Bidder	
19	Wt. of the HV winding	Kg	To be furnished by Bidder	
20	No. of LV coils/phase		To be furnished by Bidder	
21	No. of HV coils/phase		To be furnished by Bidder	
22	Height of LV winding	mm	To be furnished by Bidder	
23	Height of HV winding	mm	To be furnished by Bidder	
24	ID/OD of HV winding	mm	To be furnished by Bidder	
25	ID/OD of LV winding	mm	To be furnished by Bidder	
26	Thickness of the duct in LV winding	mm	To be furnished by Bidder	
27	Thickness of the duct in HV winding	mm	To be furnished by Bidder	

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28	Thickness of the duct between HV and LV	mm	To be furnished by Bidder	
29	Calculated Impedance	%	To be furnished by Bidder	
30	HV to earth creep age distance in oil	mm	To be furnished by Bidder	
31	LV to earth creep age distance in oil	mm	To be furnished by Bidder	

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

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The Tata Power Company Ltd		TECHNICAL SPECIFICATION FOR 11kV/415V & 22kV/415V OIL FILLED DISTRIBUTION TRANSFORMER
ENSE-DS-2008-R0		Date of Issue: 04/08/2023

ANNEXURE-I

PROFORMA FOR STAGE INSPECTION OF DISTRIBUTION TRANSFORMER

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

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

- At least 50% quantity has been tanked and
- Core coil assembly of further at least 30% of the quantity offered has been completed.
- Rest of quantity shall be in form of core assembly & coils.

ii) Quantity offered for stage inspection should be offered for final 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									
(C)	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.												
	4) Whether laminations used for top and bottom yoke are in one piece.												
	(II) Core Construction:												
	(1) No. of steps												
	(2) Dimension of steps												
	As offered:												
	Step No.	1	2	3	4	5	6	7	8	9	10	11	12

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W mm													
T mm													
As found:													
Step No.	1	2	3	4	5	6	7	8	9	10	11	12	
W mm													
T mm													
(1)													
(2) Core Diameter (mm)													
(3) Total cross sectional area of core													
(4) Effective cross sectional area of core													
(5) Whether top yoke is cut for LV connection.													
(6) If yes, at 6 above, whether Reinforcement is done.													
(7) Core length (leg center to leg center)													
(8) Window height.													
(9) Core height													
(10) Core weight only													
(D) 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 wire used for delta formation (mm)													
4) 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)													
5) Current density of winding material used for:													
a) HV													
b) LV													
6) Whether neutral formation on top.													
7) HV coils / Phase													
a) Number													

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	b) Turns/coil			
	c) Total turns			
8)	LV coils /Phase			
	a) Number			
	b) Turns / coil			
	c) Total turns			
9)	Total weight of coils of			
	a) LV winding (Kg)			
	b) HV winding (Kg)			
(E)	INSULATION MATERIALS			
	(I) Material			
	1) Craft paper			
	a) Make			
	b) Thickness (mm)			
	c) Test certificate of manufacturer (enclose copy)			
	2) Press Board			
	a) Make			
	a) Thickness (mm)			
	b) Test certificate of manufacturer (enclose copy)			
	3) Material used for top and bottom yoke and insulation			
(II)	Type and Thickness of material used : (mm)			
	a) Between core and LV			
	b) Spacers			
	c) Interlayer			
	d) Between HV and LV winding			
	e) Between phases			
(F)	CLEARANCES: (mm)			
	(I) Related to core and winding			
	1) LV to core (radial)			
	2) Between Hv and LV (Radial)			
	3) (i) Phase to phase between HV conductor			
	(ii) Whether two nos. press board each of minimum 1mm thick provided to cover the tie rods.			
	4) Thickness of duct between HV and LV coil mm			
	(II) Between core – coil assembly and tank:			
	1) Between winding and body			
	a) Tank length wise			
	b) Tank breadth wise			
(G)	TANK :			
	(I) Construction Details:			
	1) Rectangular shape			
	2) Thickness of side wall (mm)			
	3) Thickness of top and bottom plate (mm)			
	4) Provision of sloping top cover towards HV bushing.			
	5) Tank internal dimensions (mm)			
	a) Length			
	b) Breadth			
	c) Height			
	h) On HV side			
	ii) On LV side			
	(II) General Details :			

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	1) Inside painted by oil corrosion resistant paint (please specify which type of coating done)			
	2) Gasket between top cover and tank			
	a) Material			
	i) Thickness (mm)			
	ii) Jointing over laps (mm)			
	3) Provision of lifting lugs:			
	a) Numbers			
	b) Either reinforced by welded plates edge wise below the lug up to re-enforcing angle of the tank done.			
	4) Pulling lug of MS plate			
	a) Nos.			
	b) Thickness (mm)			
	c) Whether provided on breadth side or length side			
	5) Provision of air release plug			
	6) Provision of hot dip galvanized GI Nuts Bolts with 1no. plain and 1no. spring washer.			
	7) Deformation of length wise 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.			
(H)	RADIATORS:			
	1) Fin radiators of 1.2 mm thick sheet			
	a) Dimension of each fin (L × B × T)			
	b) Fins per radiator			
	c) Total No. of radiators bank			
	2) Verification of manufacturer's test certificate regarding Heat dissipation (excluding Top and Bottom) in w/sq.m			
	3) Verification of position of radiator with respect to bushing.			
(I)	CONSERVATOR			
	1) Dimensions (L × D) (in mm.)			
	2) Volume (m ³)			
	3) Inside dia. of conservator tank pipe (mm)			
	4) Whether conservator outlet pipe is projected approx. 20 mm inside the conservator tank.			
	5) Whether arrangement made so that oil does not fall on active parts.			
	6) Whether die cast metal oil level gauge indicator having three positions at (-5 deg C , 30 deg. C and 98 deg.C)			
	7) Whether drain plug and filling hole with cover is provided.			
	8) Inner side of the conservator Tank painted with -			
(J)	BREATHER:			
	1) Whether UV protected seamless acrylic body breather for silica gel provided.			
	2) Make			
	3) Capacity			
(K)	TERMINALS:			
	1) Material whether of Brass Rods/Tinned Copper.			

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	a) HV			
	b) LV			
	2) Size (dia. In mm)			
	a) HV			
	b) LV			
	3) Whether SRBP tube / insulated paper used for formation of Delta on HV.			
(L)	BUSHINGS			
	1) Whether HV bushings mounted on top cover/ side walls.			
	a) HV			
	b) LV			
	2) Whether arrangement for studs for fitting of HV Bushing are in diamond shape (so that arcing horns are placed vertically.)			
	3) Position of mounting of LV bushings			
	4) Bushing Clearance: (mm)			
	a) LV to Earth			
	b) HV to Earth			
	c) Between LV bushings			
	d) Between HV bushings			
(M)	TANK BASE CHANNEL/ ROLLERS:			
	1) Size of channel (mm)			
	2) Whether channels welded across the length of the tank			
(N)	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)			
(O)	ENGRAVING:			
	1) Engraving of Sl. No. and name of firm.			
	a) On bottom of clamping channel of core-coil assembly.			
	b) On Top cover of tank			
(P)	i) MS Plate of size 125× 125 mm welded on width side of stiffner.			
	ii) Following details engraved (as per approved GTP):			
	a) Serial Number			
	b) Name of firm			
	c) Order No. and date			
	d) Rating			
	e) Date of dispatch			
(Q)	NAME PLATE DETAILS:			
	Whether Name Plate is as per approved drawing			
(R)	COLOUR OF TRANSFORMER			
	1) Tank body with			
	2) Conservator with			
(S)	CHECKING OF TESTING FACILITIES:			
	(Calibration certificate also to be checked for its validity)			
	TESTS:			
	1) No Load Current			
	2) No Load Loss			

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	3) % Impedance			
	4) Load losses			
	5) Insulation Resistance test			
	6) Vector group Test (phase relationship)			
	7) Ratio and Polarity test relationship			
	8) Transformer oil Test (Break Down Voltage)			
	9) Magnetic Balance			
	10) Measurement of winding resistance (HV and LV both)			
	11) Induced over voltage withstand test (Double voltage and Double frequency)			
	12) Separate source power frequency withstand test at 28kV for HV and 3kV (One minute).			
	13) Air, pressure/oil leakage Test			
	14) Vacuum Test			
	15) Unbalanced current test			
	16) Temperature rise (Heat run) test.			
(T)	We have specifically checked the following and found the same as per G.T.P/ deviations observed as mentioned against each:			
	(i) Rustlessness of CRGO laminations used			
	ii) Core steps			
	iii) Core area			
	iv) Core weight			
	v) Core lamination thickness			
	vi) Winding cross sectional area			
	a) LV			
	b) HV			
	vii) Weight of windings			
	viii) Clearance between winding and wall of tank (mm)			
	a) Length-wise			
	b) Breadth-wise			
	ix) Clearance between top yoke/ top most live part of tap changer to tank cover.			
	x) Details of Neutral formation			
	xi) Connections to Bushings:			
	a) LV			
	b) HV			
	xii) Slope of tank top			
	xiii) Position of mounting of bushings			

PURCHASER'S OFFICER

BIDDER'S REPRESENTATIVE

DATE OF INSPECTION

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The Tata Power Company Ltd		TECHNICAL SPECIFICATION FOR 11kV/415V & 22kV/415V OIL FILLED DISTRIBUTION TRANSFORMER
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ANNEXURE-II

PERFORMA FOR PRE-DELIVERY INSPECTION OF DISTRIBUTION TRANSFORMERS

1.	Name of the firm	
2.	Details of offer made	
	(i) Order No. and date	
	(ii) Rating	
	(iii) Quantity	
	(iv) Sl. No. of transformers	
3.	Date of stage inspection of the lot	
4.	Reference of stage inspection clearance	
5.	Quantity offered and inspected against the order prior to this lot	

ACCEPTANCE TESTS TO BE CARRIED OUT

S No.	PARTICULARS	OBSERVATIONS
1.	(a) Ratio Test	AB/an
		BC/bn
		CA/cn
	(b) Polarity Test	
2.	No load loss measurement	
		W1
		W2
		W3
	TOTAL	
	Multiplying factor	
	CT	
	Watt meter	
	Total × MF	
	NET LOSS	
3.	Load loss measurement	
		W1
		W2
		W3
	Total	
	Multiplying factors:-	
	CT	
	Watt meter	
	PT	
	Total × MF	
	Loss at ambient temperature (Watt)	
	Loss at 75 deg C (with calculation sheet) (Watt)	

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4.	Winding Resistance :	
	H.V. (in Ohms)	
	At ambient temperature of _____deg.C	A-B
		B-C
		C-A
	Resistance at 75 deg.C	A-B
		B-C
		C-A
	L.V. (in Ohms)	
	At ambient temperature of _____deg.C	a-b
		b-c
		c-a
	Per Phase resistance at 75 deg.C	a-b
		b-c
		c-a
5.	Insulation resistance (M ohm)	HV-LV
		HV-E
		LV-E
6.	Separate source Voltage withstand test voltage:	
	HV	28 kV for 60 secs.
	LV	3 kV for 60 secs.
7.	Induced over-voltage withstand test at double voltage and double frequency	100 Hz, 830 volts for 60 seconds.
8.	No load current at	
	90% volts	
	100%	
	112.5% volts	
9.	Unbalance current	
10.	Vector group test	Diagram and readings be shown in separate sheets
11.	Percentage Impedance at 75 deg.C (Please furnish calculation sheet)	
12.	Transformer oil test (Break down voltage)	
13.	Oil leakage test	
14.	Heat run test	To be carried out against the every offered lot
15.	Bushing clearance (mm)	HV
	a) Phase to Phase	
	b) Phase to earth	LV
16.	Comments on compliance by the firm on the modifications done as per stage inspection clearance letter issued.	
17.	Whether fittings of the order have been verified.	
18.	Whether UV protected seamless acrylic tube silica gel breather is fitted on the transformers offered.	

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19.	Whether engraving of Sl.no. and name of firm on core clamping channel, side wall and top cover of tank has been verified.	
20.	Whether MS Plate of size 125 × 125 mm welded on with side of stiffner.	
21.	Whether engraving of name of firm, S No., rating of transformer, Order No. and date and Date of Dispatch on MS Plate.	
22.	Copy of calibration certificates of metering equipment be enclosed.	

POINTS TO BE SEEN / DIMENSIONS TO BE NOTED AT THE TIME OF DISMANTLING OF TRANSFORMERS:

S No.	PARTICULARS	OBSERVATIONS
1.	Details of the transformer dismantled for physical verification	
	a) Rating (kVA)	
	b) Sl. No.	
2.	Whether Hot dip galvanized Nuts and Bolts with one spring one plain washer provided for tightening the tank cover.	
3.	Details of Gasket used between top cover and tank Material	
	a) Thickness (mm)	
	b) Type of joints	
4.	Whether core is earthed properly with copper strip (one end should be tightened in between the core laminations and other end bolted on core clamping channel).	
5.	Connections from winding to bushings (describe the manner in which it has been done)	
	a) HV	
	b) LV	
6.	Winding wire dia. and cross sectional area	
	a) HV	
	I) Dia. (mm)	
	II) Area (sq.mm)	
	b) LV	
	I) L × W × Nos. of layer	
	II) Area (sq.mm)	
7.	Thickness of pressboard (s) provided between HV coils to cover the tie rods	
8.	Whether painted with oil and corrosion resistant paint	
	a) Inside the tank	
	b) Inside the conservator tank	
	c) Core clamping and core base channels	
	d) Tie rods	
	e) Core bolts	
9.	Whether tie rods and core bolts insulated, if yes, material of insulation.	

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10.	Whether flap on inner side of top cover provided to prevent direct falling of oil on core – coil assembly.	
11.	Method of joints	
	a) Between HV coils	
	b) Between tap coils	
	c) For tap changer	
12.	Whether engraving of Sl. No. and name of firm done on the bottom channel of core coil assembly.	
13.	Diameter of copper wire, used for formation of delta (should not be less than 1.5 times the dia. Of conductor). (mm)	
14.	Whether empire sleeves provided up to the end portion of HV winding jointing to bushing	
15.	HV coils :	
	a) Inner dia. (mm)	
	b) Outer dia. (mm)	
16.	LV coils :	
	c) Inner dia. (mm)	
	d) Outer dia. (mm)	
17.	Core dia.	
18.	Core height including base channel and insulation in between (mm)	
19.	Leg Center of core	
20.	Clearances between	
	a) Core and LV (mm)	
	b) HV and LV (mm)	
	c) Phase to Phase of HV coils (mm)	
	d) Core coil assembly and tank body (mm)	
	I) Length wise	
	II) Width wise	
	e) Top of yoke and top cover (mm)	
	f) Top most live part of tap changer and top cover	
21.	Weight of core only (Kg.)	
22.	Weight of windings (Kg.)	
	a) LV	
	b) HV	
23.	Whether core laminations are in one piece, used for	
	a) Bottom yoke	
	b) Top yoke	
24.	Specific remarks regarding smoothness and rusting of core used.	
25.	Volume of oil filled (to be done once against the order)	
	a) In conservator tank	
	b) In tank of the transformer	
26.	Weight of transformer (inclusive of all fittings, accessories, oil etc. complete)	
27.	Inner dimensions of the tank	

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The Tata Power Company Ltd		TECHNICAL SPECIFICATION FOR 11kV/415V & 22kV/415V OIL FILLED DISTRIBUTION TRANSFORMER
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	a) Length	
	b) Width	
	c) Height	
	I) LV side	
	II) HV side	
28.	Remarks, if any :	

Note: Please ensure that complete details have been filled in the Performa and no column has been left blank.

SIGNATURE OF PURCHASER'S
INSPECTING OFFICER
(Name and designation)

SIGNATURE OF BIDDER'S
REPRESENTATIVE
(Name and designation)

DATE OF INSPECTION: _____

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The Tata Power Company Ltd		TECHNICAL SPECIFICATION FOR 11kV/415V & 22kV/415V OIL FILLED DISTRIBUTION TRANSFORMER
ENSE-DS-2008-R0		Date of Issue: 04/08/2023

ANNEXURE-III

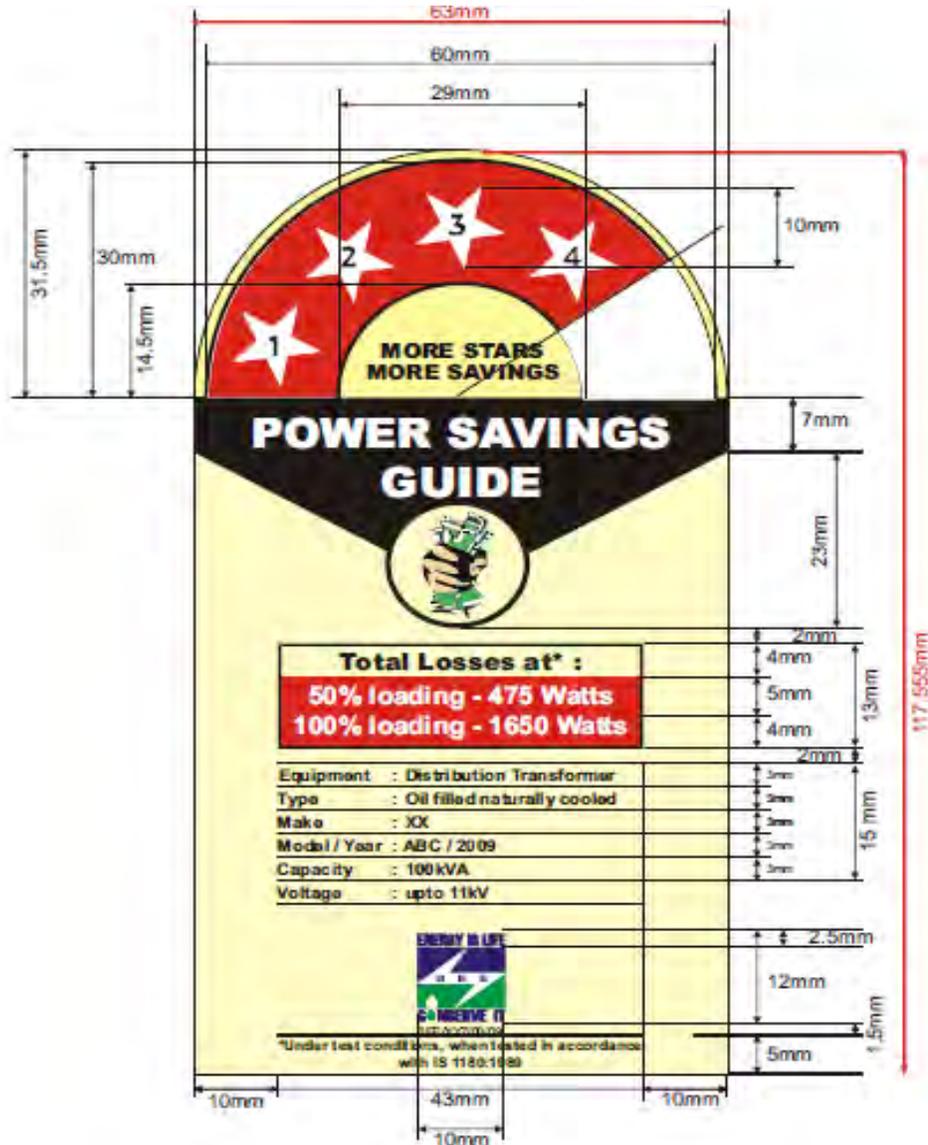
SOURCE OF MATERIAL/PLACES OF MANUFACTURE, TESTING AND INSPECTION

S No.	Item	Source of Material	Place of Manufacture	Place of testing and Inspection
1.	Laminations			
2.	Copper Conductor			
3.	Insulating winding wires			
4.	Oil			
5.	Press Boards			
6.	Kraft paper			
7.	MS Plates/Angles/Channels			
8.	Gaskets			
9.	Bushing HV/LV			
10.	Paints			

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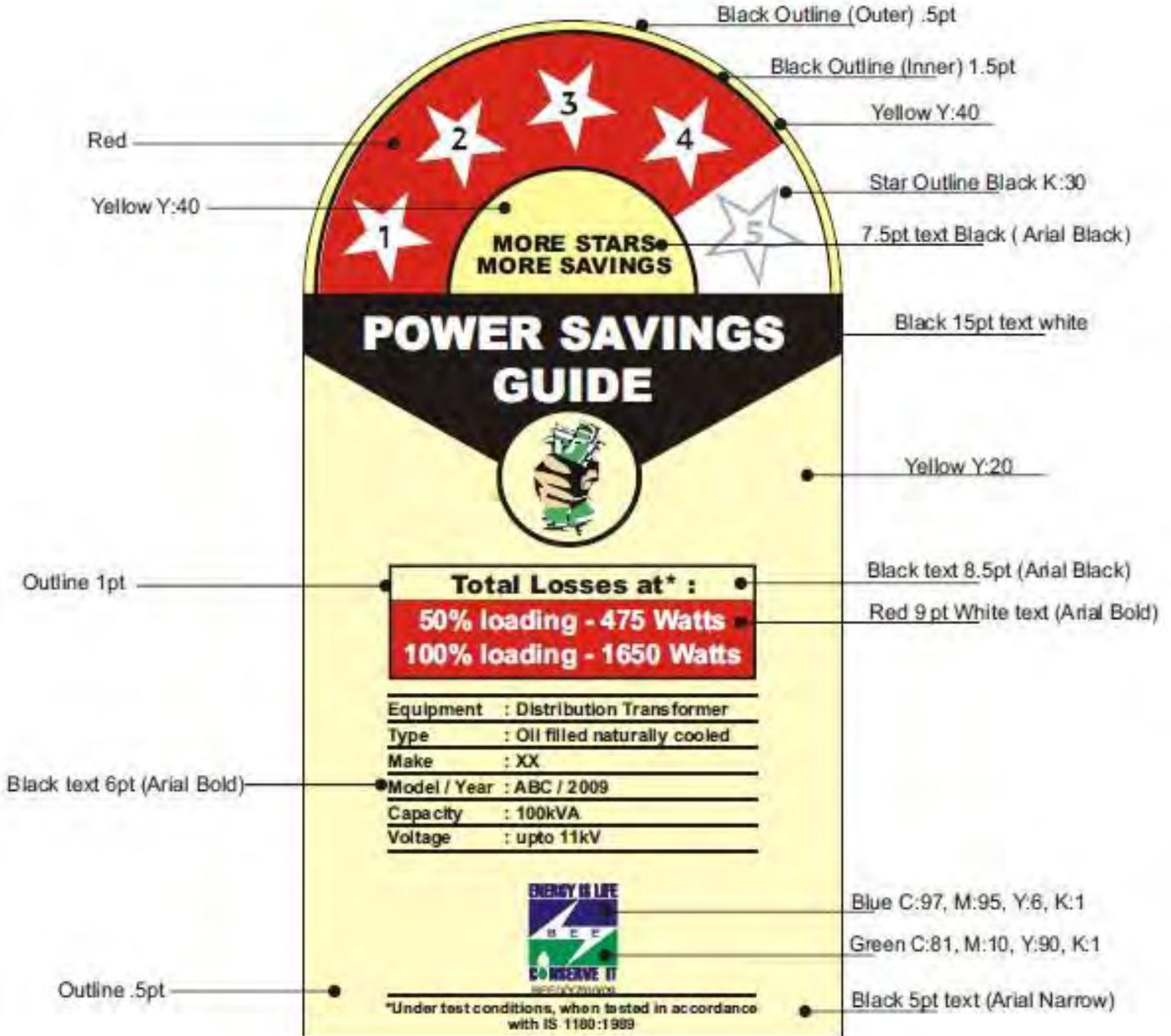
ANNEXURE-IV

- The label shall be applied on the front base of the equipment near the name plate, so as to be prominently visible on the equipment.



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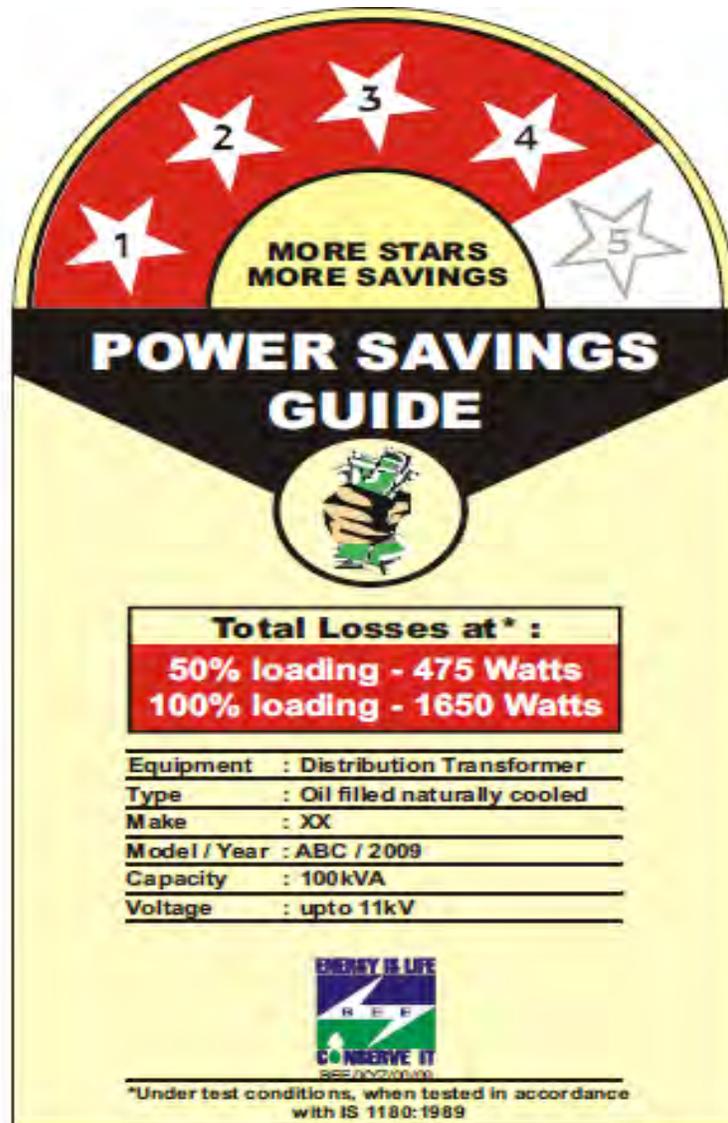
2. The following colour scheme for the label, namely:



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The Tata Power Company Ltd		TECHNICAL SPECIFICATION FOR 11kV/415V & 22kV/415V OIL FILLED DISTRIBUTION TRANSFORMER
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3. Detailed label specifications (size, colour scheme, font size, security features, if any, etc), content of the label (parameters displayed on the label) is provided below:



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The Tata Power Company Ltd		11kV/415V & 22kV/415V hermetically sealed Ester Oil Filled Distribution Transformer KNAN
ENSE-DS-2013-R00		Date of Issue: 01/08/2024

TECHNICAL SPECIFICATION

11kV/415V & 22kV/415V Hermetically sealed Ester Oil Filled Distribution Transformer KNAN

The Tata Power Company Ltd.
Engineering Services (ENSE),
Distribution Division, Senapati Bapat Marg,
Lower Parel, Mumbai – 400013 Maharashtra

The Tata Power Company Ltd		11kV/415V & 22kV/415V hermetically sealed Ester Oil Filled Distribution Transformer KNAN
ENSE-DS-2013-R00		Date of Issue: 01/08/2024

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Document Title: Technical specifications for 22KV/415V & 11KV/415V Hermetically sealed Ester Oil Filled Transformer KNAN

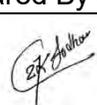
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Rev			Prepared By	Checked By	Approved and Issued By			

The Tata Power Company Ltd.
Engineering Services (ENSE),
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Lower Parel, Mumbai – 400013 Maharashtra

Rev No.	Prepared By & Date	Checked By & Date	Approved for Issue By & Date
R00	 Ketan Jadhav 01/08/24	 Ajay V. Potdar 01/08/24	Ravindra M. Bhanage 01/08/24

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1	SCOPE	<ol style="list-style-type: none"> 1. This Specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing forwarding, supply and unloading at site/store and performance of ester oil immersed, sealed type, naturally cooled, three Phase 11/0.415 kV and 22/0.415 kV, 50Hz, outdoor type Hermitically sealed Transformer. 2. The Transformer shall be complete with all components and accessories, which are necessary or usual for their efficient performance and trouble free operation under the various operating and atmospheric conditions specified in clause no. 3. 3. Such of the parts that may have not been specifically included, but otherwise form part of Transformer as per standard trade and/or professional practice and/or are necessary for proper operation of Transformer, will be deemed to be also included in this specification. The successful bidder shall not be eligible for any extra charges for such accessories etc. notwithstanding the fact that at the time of an initial offer bidder had segregated such items and quoted for them separately.
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2	APPLICABLE STANDARDS	<p>The equipment (and the materials used) covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian, IEC / International standards, with latest amendment from time to time, thereof, some of which are listed below:</p> <table border="1" data-bbox="396 898 1547 1768"> <thead> <tr> <th data-bbox="396 898 472 972">Sr. No.</th> <th data-bbox="472 898 792 972">Standard</th> <th data-bbox="792 898 1547 972">References</th> </tr> </thead> <tbody> <tr> <td data-bbox="396 972 472 1045">1</td> <td data-bbox="472 972 792 1045">IS 1180 (Part 1)</td> <td data-bbox="792 972 1547 1045">Version for Outdoor type Oil immersed Distribution Transformers up to and including 2500 kVA, 33 kV</td> </tr> <tr> <td data-bbox="396 1045 472 1119">2</td> <td data-bbox="472 1045 792 1119">IS 2026:1977/ IEC 60076 -2004</td> <td data-bbox="792 1045 1547 1119">Comply Specification for Power Transformers.</td> </tr> <tr> <td data-bbox="396 1119 472 1161">3</td> <td data-bbox="472 1119 792 1161">IS 649: 1997</td> <td data-bbox="792 1119 1547 1161">Testing for steel sheets and strips and magnetic circuits.</td> </tr> <tr> <td data-bbox="396 1161 472 1234">4</td> <td data-bbox="472 1161 792 1234">IS 4257(Part I):1981</td> <td data-bbox="792 1161 1547 1234">Dimensions for Clamping Arrangements for Porcelain transformer Bushings - Part I: For 12 kV to 36 kV Bushings.</td> </tr> <tr> <td data-bbox="396 1234 472 1329">5</td> <td data-bbox="472 1234 792 1329">IS 3347(Part I):1979</td> <td data-bbox="792 1234 1547 1329">Dimensions for Porcelain Transformer Bushings for Use in Normal and Lightly Polluted Atmospheres - Part 1: Up to and Including 1 kV.</td> </tr> <tr> <td data-bbox="396 1329 472 1371">6</td> <td data-bbox="472 1329 792 1371">IS 9335:1979</td> <td data-bbox="792 1329 1547 1371">Specification for Cellulosic Papers for Electrical Purposes.</td> </tr> <tr> <td data-bbox="396 1371 472 1413">7</td> <td data-bbox="472 1371 792 1413">IS 1576: 1992</td> <td data-bbox="792 1371 1547 1413">Solid Pressboard for Electrical Purposes -Specification</td> </tr> <tr> <td data-bbox="396 1413 472 1486">8</td> <td data-bbox="472 1413 792 1486">IEC 62770</td> <td data-bbox="792 1413 1547 1486">Specific Standard for unused natural ester liquids for Transformers and similar electrical equipment.</td> </tr> <tr> <td data-bbox="396 1486 472 1560">9</td> <td data-bbox="472 1486 792 1560">IS/IEC 60137 : 2017</td> <td data-bbox="792 1486 1547 1560">Specification for Bushings for Alternating Voltages Above 1000 Volts</td> </tr> <tr> <td data-bbox="396 1560 472 1633">10</td> <td data-bbox="472 1560 792 1633">IS 7421: 1988</td> <td data-bbox="792 1560 1547 1633">Specification for porcelain bushings for alternating voltages up to and including 1000kV.</td> </tr> <tr> <td data-bbox="396 1633 472 1728">11</td> <td data-bbox="472 1633 792 1728">IS 8603 : 2008</td> <td data-bbox="792 1633 1547 1728">Dimensions for porcelain transformers bushings for use in heavily polluted atmospheres 12/17.5kV, 24kV and 36kV.</td> </tr> <tr> <td data-bbox="396 1728 472 1768">12</td> <td data-bbox="472 1728 792 1768">IS 5561 : 1970</td> <td data-bbox="792 1728 1547 1768">Specification for Electric Power Connectors</td> </tr> </tbody> </table>	Sr. No.	Standard	References	1	IS 1180 (Part 1)	Version for Outdoor type Oil immersed Distribution Transformers up to and including 2500 kVA, 33 kV	2	IS 2026:1977/ IEC 60076 -2004	Comply Specification for Power Transformers.	3	IS 649: 1997	Testing for steel sheets and strips and magnetic circuits.	4	IS 4257(Part I):1981	Dimensions for Clamping Arrangements for Porcelain transformer Bushings - Part I: For 12 kV to 36 kV Bushings.	5	IS 3347(Part I):1979	Dimensions for Porcelain Transformer Bushings for Use in Normal and Lightly Polluted Atmospheres - Part 1: Up to and Including 1 kV.	6	IS 9335:1979	Specification for Cellulosic Papers for Electrical Purposes.	7	IS 1576: 1992	Solid Pressboard for Electrical Purposes -Specification	8	IEC 62770	Specific Standard for unused natural ester liquids for Transformers and similar electrical equipment.	9	IS/IEC 60137 : 2017	Specification for Bushings for Alternating Voltages Above 1000 Volts	10	IS 7421: 1988	Specification for porcelain bushings for alternating voltages up to and including 1000kV.	11	IS 8603 : 2008	Dimensions for porcelain transformers bushings for use in heavily polluted atmospheres 12/17.5kV, 24kV and 36kV.	12	IS 5561 : 1970	Specification for Electric Power Connectors
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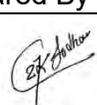
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13	IS 6103: 1971	Specification for Testing of specific resistance of electrical insulating liquids.
15	IS 6792:1992	Method for Determination of Electric Strength of Insulating Oil.
16	IS 4253: Part II: 1980	Specification for cork composition sheets- Part II: Cork and Rubber.
17	IS 5082:1998	Wrought Aluminum and Aluminum Alloy bars, Rods, Tubes, Sections Plates and Sheets for Electrical Applications.
18	IS 3401: 1992	Specification of Silica gel.
19	IS 2362:1993	Determination of water content in oil by Karl in oil Fischer Method – Test Method.
20	IS 2026 : 2009 Part-7	Loading guide for oil-immersed transformers
21	IS 104: 1979	Specification for ready mixed paint, brushing, zinc chrome, priming.
22	IS 5: 2007	Specification for Colours for ready mixed paints and enamels.
23	IS 10028: 1981	Code of Practice for Selection, Installation and Maintenance of Transformers.
24	IS 12444: 1988	Specification for continuously cast and rolled electrolytic copper wire rods for electrical conductors.
25	IS 13964: 1994	Methods of measurement of transformer and reactor sound levels.
26	IEC 60156: 1995	Method of determination of electric strength of insulating oils.
27	IEC 60156	Insulating liquids – Determination of the breakdown voltage at power frequency – Test method
29	IS 16659 : 2017	Fluids for electrotechnical applications - unused natural esters for transformers and similar electrical equipment
30	IEC 60529: 2001	Degrees of protection provided by enclosures (IP Code).
31	IS:3639	Fittings and Accessories

Material conforming to other internationally accepted standards, which ensures equal or better quality than the standards mentioned above would be acceptable, subject to prior approval from Tata Power. In case the Bidders who wish to offer material conforming to the other standards, salient points of difference between the Standards adopted and the specific standards shall be clearly brought out in relevant schedule copy of such standards with authentic English Translation shall be furnished along with the offer.

In the case of conflict the order of precedence shall be

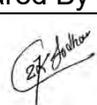
- 1) Indian Standards,
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- 3) Other alternative standards.

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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

The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.3 g.
For Mumbai the atmosphere is mainly humid across year.

4 GENERAL TECHNICAL REQUIREMENTS										
SR. No.	Description	Rating								
1	Continuous Rated Capacity (kVA)	315 kVA	400 kVA	500 kVA	630 kVA	800 KVA	1 MVA	1.25 MVA	1.6 MVA	2 MVA
2	Application	Outdoor/Indoor								
3.A	System voltage (max.) (11kV)	12kV								
3.B	System voltage (max.) (22kV)	24kV								
3.C	System voltage (max.) (6.6kV)	7.2kV								
4.A	Rated voltage HV (11kV)	11kV								
4.B	Rated voltage HV (22kV)	22kV								
4.C	Rated voltage HV (6.6kV)	6.6kV								
5	Rated voltage LV (V)	415								
6.A	Line current HV(11kV) (Amps)	16.5	20.96	26.25	33.06	41.99	52.48	65.6	83.98	104.9
6.B	Line current HV(22kV) (Amps)	8.3	10.5	13.1	16.5	21.0	26.2	32.8	42	52.5
6.C	Line current HV(6.6kV) (Amps)							109.34		
7	Line current LV (A)	438.22	556.46	685.6	876.43	1112.9	1391.2	1739	2225.8	2782.3
8	Frequency (Hz)	50 Hz								

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9	No. of Phases	Three								
10	Connection HV	Delta								
11	Connection LV	Star (Neutral Brought out)								
12	Vector group	Dyn-11								
13	Type of cooling	KNAN								
14	Tap changing arrangement	+10.0% to -10% in steps of 2.5% Off load (OCTC)								
15	No. of tap positions	9								
	Noise level at rated voltage and frequency (as per NEMA Tr-1)	56 dB	56 dB	56 dB	57 dB	57 dB	58 dB	60 dB	60 dB	61 dB
17	Permissible temperature rise over ambient:									
17.1	Of top oil measured by thermometer	40 °C								
17.2	Of winding measured by resistance	45 °C								
18.A	Max. Total Losses at 100% loading at 75°C (watts) (11kV)	3100	3450	4300	5300	6403	7700	9200	11800	15000
18.B	Max. Total Losses at 100% loading at 75°C (watts) (22kV)	3255	3622.5	4515	5565	6723.1	8085	9660	12390	15750
19.A	Max. Total Losses at 50% loading) at 75°C (Watts) (11kV)	1025	1225	1510	1860	2287	2790	3300	4200	5050
19.B	Max. Total Losses at 50% loading) at 75°C (Watts) (22kV)	1076.2	1286.2	1585.5	1953	2401.3	2929.5	3465	4410	5302.5
Note: For 22 KV, total losses shall not exceed 5% of above mentioned 11 KV respective ratings.										
20	Short circuit impedance voltage at 75°C (±10% tolerance)	4.50%	4.50%	4.50%	4.50%	5%	5%	5%	6.25%	6.50%
21	Insulation Class	A								
22	Normal Flux Density(at rated voltage and frequency)	1.69 T (Max)								
23	Maximum flux density (Increase of +12.5% combined voltage and frequency variation from rated voltage and frequency)	1.9 T (Max.)								
24	Maximum current density (A/mm ²)	2.5 A/mm ²								
25.A	Impulse withstand voltage (11kV)	75 kVp								

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25.B	Impulse withstand voltage (22kV)	125 kVp								
25.C	Impulse withstand voltage (6.6kV)	60 kVp								
26.A	Power frequency withstand voltage(11kV)	28 kV								
26.B	Power frequency withstand voltage(22kV)	50 kV								
26.C	Power frequency withstand voltage(6.6kV)	20 kV								
26.D	Power frequency withstand voltage (LV)	3 kV								
27	Voltage fluctuations permissible	+12.5% to -12.5%								
28	Neutral terminal	Two separate brought out neutral from main neutral bus bar, One for taking out the neutral for 4 wire system and other additional neutral for solid earthing.								
29	Neutral CT	All rating shall have protection class neutral CT instead of metering CT.								
29.1	Neutral CT Ratio for LV side	500/5	600/5	800/5	1000/5	1250/5	1500/5	2000/5	2500/5	3000/5
30	Minimum clearances in Cable Box (mm) :									
30.A	HV phase to phase/ phase to earth (11kV)	130 / 80								
30.B	HV phase to phase/ phase to earth (22kV)	240 / 140								
30.C	LV phase to phase/ phase to earth	25 / 20								
32	Wheels	The transformer shall be provided with four bi-directional rollers with locking arrangement suitable for rail gauges in both the axis for movement of transformer in either direction. Distance between wheels shall be center to center 820mm.								

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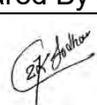
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5	GENERAL CONSTRUCTION	<ol style="list-style-type: none"> 1. The transformer shall be double wound, copper coil, oil immersed, naturally cooled (KNAN) and sealed type with plain rectangular tank. 2. The transformer shall be suitable for service with fluctuations in supply voltage up to plus 12.5% to minus 12.5%. 3. The transformer and accessories shall be designed to facilitate operation, inspection, maintenance and repairs. The design shall incorporate every precaution and provision for the safety of equipment as well as staff engaged in operation and maintenance of equipment. 4. All outdoor apparatus, including bushing insulators with their mountings, shall be designed to avoid any accumulation of water. 5. The transformer shall be designed suitable for service life of 25years.
5.1	CORE	<ol style="list-style-type: none"> 1. Transformer core shall be stack type, constructed from high grade cold rolled, non-ageing, grain oriented, silicon steel lamination which shall be properly annealed (under inert atmosphere, if required) to relieve stresses. 2. The core shall have low loss and good grain properties. It should be coated with hot oil proof insulation, bolted together with frames to prevent vibration and noise. 3. Core laminations should be coated with hot oil proof, with insulation coating, an inorganic coating equivalent to C-5 type as ASTM A976 or IS 3024, like Carlite -3. 4. All core should be clamped together with frames to prevent vibration and noise. The core clamping shall be preferably without through bolts and if any bolt used same shall be effectively insulated. 5. The core thickness should be 0.23mm or less and grade should be M3 or better. 6. All core clamping bolts (if any) shall be effectively insulated. 7. Only one grade and one thickness of core shall be accepted and mixing of different grades shall not be allowed. 8. The complete design of the core must ensure maximum permanency of the core losses without continuous working of the transformers. 9. The value of the maximum flux density allowed in the design and grade of lamination used shall be clearly stated. The vendor shall submit the calculations in support of the same. 10. The transformer shall be suitable for continuous service without damage under 'over fluxing' where the ratio of voltage over frequency exceeds the corresponding ratio at rated voltage and rated frequency up to 12.5% and the core shall not get saturated. 11. The No Load current shall not exceed 2% of the Full Load current and will be measured by energizing the transformer at rated voltage and frequency. Increase of 12.5% of rated voltage shall not increase the no-load current by 5% maximum of full load current. 12. The bidder shall be required to submit the following documents in regard to procurement of core material: <ol style="list-style-type: none"> a. Invoice of supplier b. Mill's test certificate c. Packing list d. Bill of landing e. Bill of entry certificate by custom f. Description of material, electrical analysis, physical inspection certificate for surface defects, thickness and width of material. 13. The bidder shall offer the core for inspection and approval of Tata power during the manufacturing stage. Heavy penalty or blacklisting shall be imposed on the bidders using defective CRGO sheets.

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5.2	WINDING CONNECTIONS	<ol style="list-style-type: none"> 1. Primary and secondary windings shall be constructed from high- conductivity (copper conductors), Double Paper Covered (DPC) copper conductor. 2. The bidder shall submit characteristics of insulation paper with the offer. 3. The current density for HV and LV winding should not be more than 2.5 Ampere per sq.mm. 4. The insulation between core and bolts and core and clamps shall withstand 2.5 kV for one minute. 5. Inter layer insulation both for HV and LV windings shall be Epoxy dotted Kraft paper and pressboard of standard make or any other superior material subject to approval of Tata Power. 6. All spacers, axial wedges / runners used in windings shall be made of pre- compressed solid pressboard. In case of cross-over coil winding of HV all spacers shall be properly sheared and dovetail punched to ensure proper locking. All axial wedges/runners shall be properly milled to dovetail shape so that they pass through the designed spacers freely. Insulation shearing, milling and punching operations shall be carried out in such a way, that there should not be any burr and dimensional variations. Proper bonding of inter layer insulation with the conductor shall be ensured. Test for bonding strength shall be conducted as per standards. 7. LV winding shall be such that neutral formation is at the top. 8. All turns of windings shall be adequately supported to prevent movement. The core/coil assembly shall be securely held in position to avoid any movement under short circuit conditions. 9. The joints in the winding shall be avoided but if it is necessary then, these shall be properly brazed and the resistance of the joints shall be less than that of parent conductor
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5.3	LOSSES	<p>The bidder shall guarantee the total loss at 50% and 100% load condition (at rated voltage and frequency and at 75°C) and these should be within the limits of maximum total losses declared by Tata Power for both 50% and 100% loading values (as per table below).</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #d9e1f2;">Description</th> <th style="background-color: #d9e1f2;">315 kVA</th> <th style="background-color: #d9e1f2;">400 kVA</th> <th style="background-color: #d9e1f2;">500 kVA</th> <th style="background-color: #d9e1f2;">630 kVA</th> <th style="background-color: #d9e1f2;">800 KVA</th> <th style="background-color: #d9e1f2;">1 MVA</th> <th style="background-color: #d9e1f2;">1.25 MVA</th> <th style="background-color: #d9e1f2;">1.6 MVA</th> <th style="background-color: #d9e1f2;">2 MVA</th> </tr> </thead> <tbody> <tr> <td>Max. Total Losses at 100% loading at 75°C (watts) (11kV)</td> <td>3100</td> <td>3450</td> <td>4300</td> <td>5300</td> <td>6403</td> <td>7700</td> <td>9200</td> <td>11800</td> <td>15000</td> </tr> <tr> <td>Max. Total Losses at 100% loading at 75°C (watts) (22kV)</td> <td>3255</td> <td>3622.5</td> <td>4515</td> <td>5565</td> <td>6723.1</td> <td>8085</td> <td>9660</td> <td>12390</td> <td>15750</td> </tr> <tr> <td>Max. Total Losses at 50% loading) at 75°C (Watts) (11kV)</td> <td>1025</td> <td>1225</td> <td>1510</td> <td>1860</td> <td>2287</td> <td>2790</td> <td>3300</td> <td>4200</td> <td>5050</td> </tr> <tr> <td>Max. Total Losses at 50% loading) at 75°C (Watts) (22kV)</td> <td>1076.2</td> <td>1286.2</td> <td>1585.5</td> <td>1953</td> <td>2401.3</td> <td>2929.5</td> <td>3465</td> <td>4410</td> <td>5302.5</td> </tr> </tbody> </table>	Description	315 kVA	400 kVA	500 kVA	630 kVA	800 KVA	1 MVA	1.25 MVA	1.6 MVA	2 MVA	Max. Total Losses at 100% loading at 75°C (watts) (11kV)	3100	3450	4300	5300	6403	7700	9200	11800	15000	Max. Total Losses at 100% loading at 75°C (watts) (22kV)	3255	3622.5	4515	5565	6723.1	8085	9660	12390	15750	Max. Total Losses at 50% loading) at 75°C (Watts) (11kV)	1025	1225	1510	1860	2287	2790	3300	4200	5050	Max. Total Losses at 50% loading) at 75°C (Watts) (22kV)	1076.2	1286.2	1585.5	1953	2401.3	2929.5	3465	4410	5302.5
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Note: For 22 KV, total losses shall not exceed 5% of above mentioned 11 KV respective ratings.

- No positive tolerance shall be allowed on the losses as mentioned above. However, bidder can offer losses less than specified but no consideration in cost will be given for the same.**
- The successful bidder shall guarantee the quoted losses for at least five years. If at any point of time during operation if it is found that the total losses at 50% and 100% load are more than the values given in specifications, then bidder shall be liable to pay a fine of Rs. 250 per watt to the amount by which losses at 50% loading and 100% loading increase the values given in specifications.**
- During testing at Bidder's works if it is found that the actual measured losses are more than the values quoted by the Bidder, TATA POWER shall reject the transformer and shall have the right to reject the complete lot.
- During testing at Bidder's works, if the temperature rise exceeds the specified values, the entire lot shall be rejected by TATA POWER.
- During testing at Bidder's works, if the impedance values differ from the guaranteed values including tolerance, the transformer shall be rejected by TATA POWER.

5.4 TRANSFORMER TANK AND TANK CONSTRUCTION

- The transformer tank shall be of robust construction, **rectangular in shape, corrugated type, hermitically sealed** and shall be built up of electrically tested welded mild steel plates.
- The tank shall be fabricated by welding at corners. No horizontal or vertical joints in tank side walls and its bottom or top cover shall be allowed.
- All welding operations should be carried by **qualified welders** (performance qualification certificates to the customer) as per the relevant ASME standards and a copy of the **welding procedure** has to be submitted to TATA POWER.
- The **thickness of tank** should be as below:

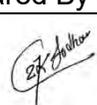
Top and Bottom	6mm (minimum)
Four side	5mm (Minimum)
- The tolerances as per IS 1852 shall be applicable.**
- In addition the cover of the main tank shall be provided with an **air release plug**.
- The tank plates shall be of such strength that the complete transformer when filled with oil may be lifted bodily by means of the lifting lugs provided. The top cover shall have no cut at point of lifting lug.
- The transformer tank cover shall be bolted/clamped alternatively welded with tank rim so as to make a leak proof joint. The curb design shall be such that it is possible to remove the weld and re weld the tank at least two times.
- The tank plate and lifting lugs shall be of such strength that the complete transformer filled with oil may be lifted by means of lifting shackle.
- The tank cover shall have slight slope (10 mm ± 2mm) towards HV side to drain rain water.
- There must be sufficient space from the core to the top cover to take care of oil expansion. The oil volume inside the tank shall be such that even under the extreme operating conditions, the **pressure generated inside the tank does not exceed 0.4 kg/sq. cm positive or negative** and the tank shall be of adequate mechanical strength to withstand it.
- The transformer should be capable of **withstanding 0.8kg/sq.cm and a vacuum of 0.7kg/sq.cm**. The permanent deflection of the flat plate, when the tank without oil is

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subjected to a vacuum of 525 mm of mercury shall not be more than the values specified:

Length of plate	Deflection
Up to 750 mm	5.0 mm
751 mm to 1250 mm	5.0 mm
1251 mm to 1750 mm	5.0 mm
Above 1751	5.0 mm

13. The tank design shall be such that the core and the windings can be lifted freely without dismantling the bushings.
14. The tightening torque chart to be provided for all bolts used. Bolt grade 5.6 or higher TS. This shall be submitted along with each rating drawings.
15. An enclosure of MS with terminal block should be provided on tank body so as to facilitate the connection of energy meter to DT. Also, suitable holes with glands to be provided on bottom side of this box as incoming and outgoing for 10 core 2.5 sq.mm cable.
16. **Lifting Lugs:**
The transformer shall be provided with a minimum of four welded heavy duty enclosed lifting lugs of Structural steel E250 or better grade quality A (Minimum quality A) as per IS 2062 plate of minimum 16mm thickness and 165mm welding length on tank for lower rating 160 & 250kVA. Minimum 20mm thickness and 165mm welding length on tank for 400kVA, 500kVA, Minimum 20mm thickness and 180mm welding length on tank 630kVA, Minimum 22mm thickness and 200mm welding length on tank for 1000kVA. This shall gradually increase for higher rating as per weight. These shall be reinforced with vertical supporting flat stiffener below lug up to stiffener angle. This shall have smooth min. 7mm welding on all sides. This is to be checked during routine testing of tank & stage inspections.
17. **All transformer lifting lug shall be painted with yellow colour.**
18. The location of lifting lugs shall be such that the clearance between lifting chain and nearest part of bushing or PRV or other part shall be at least 100 mm.
19. There shall be facilities for lifting the core coil assembly separately.
20. The lifting lugs shall be designed in such a way that any two diagonal lugs are capable of lifting two times of the total weight of the transformer. The design of should be such that it should be suitable for 120degree lifting rope angle as per ASME B30.9 and at any point of time the maximum stress allowed on the Lug martial shall be lesser than 82MPa as per ANSI C.57.12.10
21. Calculation sheet for Lifting lug design to be submitted by Bidder. The calculation shall include the Stress on lifting lug material and stress on welding both. The Stress on the welding should be less than 840kg/cm² as per ANSI C.57.12.10. All calculation to be done for considering lifting on any diagonal opposite two lugs conditions.
22. The lifting lugs shall be located on the side walls only. Separate drawing to be submitted stating welding thickness, welding length (min. 120mm for 160KVA and higher as per rating and load) and location on tank along with stiffener support for all rating and all lugs.
23. All joints of tank and fittings shall be oil tight and no bulging shall occur during service.
24. Inside of tank shall be painted with hot oil restraint paint and minimum oil level mark shall be embossed inside the tank (at 25° C).
25. Anti –theft stainless steel fasteners with breakaway nut shall be provided at top cover (minimum 4 no's at corners).

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5.5	RADIATORS	<ol style="list-style-type: none"> Radiators to be of corrugated type & part of tank. The Pressed Steel type should be used in vertical formation without any bending and should be individually tested for leakage and pressure test etc. before welding with the main tank. Thickness of sheet for radiators shall be 1.20 mm (min). The number / cross section / length / fixing arrangement of radiators shall be indicated in the general assembly drawing. 						
5.6	GASKET	Nitrile / Neoprene / cork rubber gaskets conforming to Type III as per IS 11149/Type C as per IS 4253 (Part-2) shall be provided.						
5.7	TAPS	<ol style="list-style-type: none"> Tap changing shall be carried out by means of an externally operated self-position switch and when the transformer is in de-energised condition. The taps shall be provided in HV winding and each tap change shall result in voltage variation of 2.5%. Switch position no.1 shall correspond to the maximum plus tapping (i.e., +10%) and position no.9 shall correspond to minimum tapping (i.e.,-10%). Provision shall be made for locking the tapping switch handle in position. Suitable plate shall be fixed for tap changing switch to know the position number of tap. 						
5.8	BUSHINGS	<p>HT Bushings:</p> <table border="1" data-bbox="451 835 998 907"> <tr> <td>11kV</td> <td>12kV</td> <td>250A</td> </tr> <tr> <td>22kV</td> <td>24kV</td> <td>250A</td> </tr> </table> <ol style="list-style-type: none"> For Plinth mounted transformers: Transformer shall be with HT cable box on Sideways having porcelain rod bushing. Rods and nuts shall be made of tinned brass material. Tinned Copper busbar of 100mm long with 50mmx6mmSize: The tinned copper busbar to be provided on HV cable box one size shall fixed in bushing stud with tinned brass bolts and washers. Other side should have hole with M16 bolts for fixing of Lug. The transformers shall be plinth mounted with HT side cable box, with bushing having creepage distance of 25mm/kV. The HV bushings shall be on top of the tank. <p>LT Bushings (1.1kV/suitable current rating):</p> <ol style="list-style-type: none"> The bushings shall be of outdoor type made of porcelain/Epoxy material and rods and nuts shall be made of tinned copper material. The metal portion of the internal HV & LV bushing inside the tank shall remain dipped in oil in all operating condition. IS to be followed: IS 3347(Part-I) and IS 7421(latest amendment of IS). The LV bushings shall be provided on the top of the tank. LT bushing to be rated for 1.1K V. 	11kV	12kV	250A	22kV	24kV	250A
11kV	12kV	250A						
22kV	24kV	250A						
5.9	CABLE BOXES	<ol style="list-style-type: none"> All transformer ratings shall have HT & LT side cable box without any glands. Cable boxes made up of Mild Steel with suitable handle and front cover shall be provided for both HV and LV side. Water should not accumulate on cable boxes and proper slope shall be provided to ensure drainage of water. Cable box protection should be IP 55. HV and LV cable boxes shall be fixed on opposite sides on the tank with nuts and bolts (gasket placed in between them) in such a way that they can be completely removed whenever required. 						

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6. Canopy shall be provided on all gasket joints covering each cable box.
7. Suitable cable clamping/cleating arrangements shall be provided to keep Cable straight and to support cables to avoid tension on bushings due to cable weight.
8. Non-magnetic Gland plates shall be provided for both HV and LV cable box drilled with suitable no. of holes required for installation (as mentioned below).
9. Gland plates shall be mounted separately with nut & bolt arrangement and gasket in between them.
10. Support for GI earth strip size 65x10mm shall be provided to avoid tension on secondary neutral bushing.
11. The size of the cable box cover should be moderate so that only 2 people is enough to lift it.
12. During acceptance test - Magnetic Balance Test on HV & LV side, with magnetizing current HV and LV side.
13. **1 KG Eco friendly Orange Silica Gel Breathers are to be provided in HV and LV cable box to avoid moisture ingress on cable terminations.**

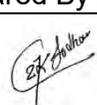
HV CABLE BOX:

14. One part of the HV box shall be fixed on transformer and other parts/ cover shall be removable for cable termination.
15. Mild Steel earthing clamps shall be provided in the HV box to earth the armour of HV cable.
16. For 11 KV, 3 C X 300 sq.mm / 3 runs 1 C x 185 sq mm and for 22kV, 3C x 240sq.mm / 3 runs 1 C x 185 sq mm XLPE Cable shall be used at HV side. HV box should be suitable for heat shrink of this cable. The distance between HV gland plate and HV bushings should be minimum 600 mm.
17. Earthing provision (Body earth) shall be provided in the HV box to earth the armour of HV cable.
18. Standard Danger marking plate as per IS to be fixed on front of cover.
19. HT side cable box, with bushing shall have creepage distance of 25mm/kV only.

LV CABLE BOX:

20. Neutral terminal of LV winding shall be brought out on LV phase terminals to form four wire system.
21. Epoxy Insulators shall be provided from top side in LV box to support LV busbar.
22. LV busbar shall be of AL material & shall have sufficient clearances between nut bolts with Lugs between each phases & phase and neutral.
23. All LT wiring shall be tested for 2kV withstand test during acceptance.
24. The no. and size of cables for installation on LV side shall be as follows:

Transformer Rating	Size of cable for Phase & Neutral	No. of runs
315 kVA	4C x 300 sq. mm (1.1 kV Class)	2
400 kVA		3
500 KVA		3
630 kVA		4
800 kVA		5
1 MVA		5

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		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 150px;">1.25MVA</td> <td style="width: 150px;">7</td> </tr> <tr> <td>1.6 MVA</td> <td>8</td> </tr> <tr> <td>2 MVA</td> <td>10</td> </tr> </table> <p>25. The neutral of the star connected winding shall be brought out to a separate bushing terminal of 1.1KV class. Neutral CT should be installed before bifurcation. The neutral bushing shall be provided outside body of transformer to facilitate lead the earth conductor down to ground level.</p> <p>26. The Neutral Should be mounted with FRP/Bakelite sheets, firmly, so that LV neutral bus should not touch the CT. Provision shall be provided to enable the transformer to be removed without cutting the termination of the cables from the gland plates.</p>	1.25MVA	7	1.6 MVA	8	2 MVA	10																		
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1.6 MVA	8																									
2 MVA	10																									
5.10	TERMINAL CONNECTORS	<p><u>HT TERMINAL CONNECTOR:</u></p> <ol style="list-style-type: none"> All ratings shall be suitable for 11kV, 3CX300 sq.mm or 22kV, 3CX240 sq.mm XLPE shall be provided at HT side for cable connection. Tinned Copper busbar of 100mm long with 50mmx6mmSize: The tinned copper busbar to be provided on HV cable box one size shall fixed in bushing stud with tinned brass bolts and washers. Other side should have hole with M16 bolts for fixing of Lug. <p><u>LT TERMINAL CONNECTOR:</u></p> <ol style="list-style-type: none"> Tinned Brass palm connector (with suitable current rating), suitable bimetallic washer (between palm connector and Aluminum Busbar) and Aluminum busbar (current density: not more than1 A/mm²) shall be provided. 																								
5.11	CURRENT TRANSFORMER	<p>Only protection class Neutral CT to be provided as mentioned below:</p> <p>Neutral Current transformer:</p> <ol style="list-style-type: none"> All transformer shall be supplied with LT side neutral CT before bifurcation of neutral for earthing. The Neutral CTs shall be window type, resin cast, protection class having ratio & knee voltage as per following table. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Parameter</th> <th>Neutral CT</th> </tr> </thead> <tbody> <tr> <td>Accuracy class</td> <td>5P20</td> </tr> <tr> <td>Burden</td> <td>15 VA</td> </tr> <tr> <td>Application</td> <td>Earth fault protection</td> </tr> <tr> <td>Transformer rating</td> <td>CT Ratio & knee point</td> </tr> <tr> <td>500 KVA</td> <td>1000/5 & min 60 V</td> </tr> <tr> <td>630 KVA</td> <td>1000/5 & min 60 V</td> </tr> <tr> <td>800 KVA</td> <td>1250/5 & min 60 V</td> </tr> <tr> <td>1000 KVA</td> <td>1500/5 & min 80 V</td> </tr> <tr> <td>1250 KVA</td> <td>2000/5 & min 100 V</td> </tr> <tr> <td>1600 KVA</td> <td>2500/5 & min 100 V</td> </tr> <tr> <td>2000 KVA</td> <td>3000/5 & min 130 V</td> </tr> </tbody> </table>	Parameter	Neutral CT	Accuracy class	5P20	Burden	15 VA	Application	Earth fault protection	Transformer rating	CT Ratio & knee point	500 KVA	1000/5 & min 60 V	630 KVA	1000/5 & min 60 V	800 KVA	1250/5 & min 60 V	1000 KVA	1500/5 & min 80 V	1250 KVA	2000/5 & min 100 V	1600 KVA	2500/5 & min 100 V	2000 KVA	3000/5 & min 130 V
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		<p>2. Current transformer shall be mounted outside the tank with suitable clamping arrangement and should be C-shaped of sliding, soft material, non-screw type. The current transformer shall comply with IS 2705.</p> <div data-bbox="586 312 1320 808" data-label="Diagram"> <p style="text-align: center;">Three Phase LT Schematic</p> <p style="text-align: center;">DYN11 TRF</p> <p style="text-align: center;">Neutral CT</p> <p>R Y B N</p> </div> <p>3. The terminals shall not have shorting facility. CT terminal box for secondary of CT shall be provided of suitable size on the side of transformer. Box shall have droppable terminal blocks with shorting link. Neutral CT to be located before bifurcation of neutral.</p>
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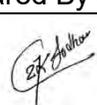
5.12	EARTHING CONNECTIONS	<p><u>NEUTRAL EARTHING:</u></p> <ol style="list-style-type: none"> 1. Separate LV neutral bushing to be provided on top of LV box for neutral earthing. 2. For connecting LV neutral bushing shall be provided with 2 No's of 50x6 mm GI strip (The thickness of GI coating of neutral earthing strip shall be 60 microns (minimum)). 3. At the bottom of the GI strips two concentric holes of 12 mm diameter shall be made and suitable nuts & bolts shall be provided for them. <p><u>BODY EARTHING:</u></p> <ol style="list-style-type: none"> 4. Two body earthing terminals, located on the lower side of the transformer, diagonally opposite to each other of M12 size (taken 50mm out of tank) shall be provided on Transformer tank with Bolt.
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5.13	EQUILISING/ EQUIPOTENTIAL STRIP	<ol style="list-style-type: none"> 1. The Transformer top cover shall be connected at two places (diagonally opposite with each other) with the tank by tinned copper strip (30mm wide, 0.7mm thick). 2. The strip should touch bare surface of tank to ensure proper electrical connection of tank body with top cover with the strip.
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5.14	OIL	<ol style="list-style-type: none"> 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:
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Sr.	Property	Limits
1	Appearance	The oil shall be clear and transparent and free from suspended matter or sediments
2	Viscosity, mm ² /sec @ 100 °C @ 400 °C	Max 15 Max 50
3	Pour Point	Max -10° C
4	Water Content (mg/kg) (PPM)	Max 200
5	Density (gm/ Cm ³) @20°C	Max 1.0
6	Dielectric breakdown voltage (2.5 mm gap)	Min 60 KV
7	Dissipation Factor Tan Delta @ 90°C, 50 Hz	Max 0.05
8	Flash Point (°C)	Min 250
9	Fire Point (°C)	Min 300
10	Soluble acidity, mg KOH/gm	Max 0.06
11	Corrosive sulphur	Non-Corrosive
12	Physical Properties	
13	Density at 20 °C (gm./Cm ³)	Max 1.0
14	Specific Heat at 20 °C (J/kg K)	Min 1800
15	Thermal Conductivity @ 20 °C (W/m K)	0.18
16	Pour Point (°C)	Min -10°C
17	Coefficient of Thermal Expansion (1/°C)	0.00074
18	Flash Point (°C)	Min 250°C
19	Fire Point (°C)	Min 300 °C
20	Auto ignition Point (°C)	Min 350
21	Classification	K2
22	Biodegradable	Yes
23	Acid Number (mg KOH/g)	Max 0.06
24	Net Calorific Value (MJ/kg)	38.3
25	Water Content mg/kg (PPM)	Max 200
26	Breakdown Voltage (kV)	Min 60
27	Dissipation Factor at 90 °C	Max 0.05

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The Tata Power Company Ltd		11kV/415V & 22kV/415V hermetically sealed Ester Oil Filled Distribution Transformer KNAN
ENSE-DS-2013-R00		Date of Issue: 01/08/2024

5.15	OIL LEVEL INDICATOR	<ol style="list-style-type: none"> Oil level indicator with prismatic glass shall be provided. The oil gauge glass shall be removable and so embodied in the end plate to prevent oil leakage. The Oil level indicator should indicate oil level at minimum, normal and maximum as -5°C, 30°C and 90°C respectively.
5.16	DGPT2 relay	<ol style="list-style-type: none"> The DGPT2 relay model should be fully complying with standard EN 50216-1, EN 50216-3, EN 60529, EN 62262, EN IEC 60721-3-4, EN ISO 9227 <ol style="list-style-type: none"> The following fault should detect by relay: <ol style="list-style-type: none"> Internal gas generation/emission Trapped air or entrance of air Overheating of transformer Excess pressure DGPT2 relay should be installed on top side of transformer.
5.17	CENTRE OF GRAVITY	The transformer should be designed in such a way that the centre of gravity of complete transformer with oil and with all accessories shall fall at the vertical centre at lower height such that the transformer should be stable on flat surface ground and while lifting at lifting hooks.
5.18	PRESSURE RELEASE DEVICE	<ol style="list-style-type: none"> All rating shall have PRV/PRD only. PRV shall be provided to operate before reaching the test pressure as specified in the above class. PRV shall not have air release arrangement. The PRV shall seal-off after the excess pressure has been released and it shall have mechanical flag arrangement. The PRV shall have NO, NC contacts. Canopy to be provided over PRD.
5.19	AIR RELEASE PLUG	The cover of the main tank shall be provided with an air release plug on all ratings.
5.20	DRAIN VALVE AND FILTER VALVE	<ol style="list-style-type: none"> The drain valve and filter valve shall be of Brass with gate valve. The drain valve and filter valve shall have double round flanges. One side shall be fixed with tank and other side should be left open for oil filling/filtration purpose. The drain valve and filter valve shall be provided with embossed name plate stating drain valve and filter valve. The drain valve shall be located on the bottom and filter valve shall be provided at side top of tank. Locking arrangement shall be provided to stop movement of hand wheel. The valves shall be covered with a MS box by welding on tank.
5.21	OIL TEMPERATURE INDICATOR	<ol style="list-style-type: none"> Dial Type Oil temperature indicator shall be provided on the top cover of the transformer. It should be suitable for outdoor mounting with maximum indicator pointer. Fixing union shall be of female thread. Dial size : 100 mm (dial should be made up of stainless steel) Range: 0- 120 °C, Accuracy: ± 2 °C. The OTI to be placed in marshalling box & It should have alarm and trip contacts at predetermined temperatures.

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		5. For Tata Power Mumbai all rating shall have OTI with alarm & trip contacts and to be placed in marshalling box.				
5.22	FASTENERS	<p>1. All the bolts or studs shall be at least 6 mm in diameter except when used for small wiring terminals.</p> <p>2. All nuts/bolts/washers exposed to atmosphere shall be as follows:</p> <table border="1" data-bbox="496 464 1336 558"> <tr> <td>Size 12mm (or below)</td> <td>Stainless Steel</td> </tr> <tr> <td>Above 12mm</td> <td>Steel with antirust coating ,Hot dip galvanized (80 microns thickness)</td> </tr> </table> <p>3. All ferrous bolts, nuts and washers placed in outdoor positions shall be hot dip galvanized to prevent corrosion (except high tensile steel bolts and spring washers which shall have electrolytic action between dissimilar metals). In case the galvanization is removed due to welding or manufacturing, the parts should be properly cleaned and painted to avoid exposure to atmosphere.</p> <p>4. Each bolt shall project at least one thread but more than three threads through the nut. If bolts and nuts are placed so that they are inaccessible by means of ordinary spanners, special spanners shall be provided. The length of the screwed portion of the bolts shall be such that no screw thread may form part of a shear plane between members.</p> <p>5. Taper washers shall be provided where necessary. Protective washers of suitable material shall be provided on front and back of the securing screws.</p>	Size 12mm (or below)	Stainless Steel	Above 12mm	Steel with antirust coating ,Hot dip galvanized (80 microns thickness)
Size 12mm (or below)	Stainless Steel					
Above 12mm	Steel with antirust coating ,Hot dip galvanized (80 microns thickness)					

5.23	SURFACE PREPARATION AND PAINTING	<p>1. The paint shall be applied by airless spray.</p> <p>2. Steel surfaces shall be prepared by shot blast cleaning (IS-9954) to grade Sq.2.5 of ISO 8501-1 or chemical cleaning including phosphating of the appropriate quality (IS 3618).</p> <p>3. Heat resistant (Hot oil proof) paint shall be used for the inside surface and whereas for external surface one coat of thermosetting powder paint or one coat of epoxy primer (zinc chromate) followed by two coats of polyurethane (P.U.) base paint. as per table given below:</p> <table border="1" data-bbox="487 1226 1458 1514"> <thead> <tr> <th>Sr. No.</th> <th>Paint type (should be UV restraint, non-fading)</th> <th>Area to be painted</th> <th>No of coats</th> <th>Total dry film thickness (min); micron</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Thermosetting powder paint</td> <td>Inside</td> <td>01</td> <td>30</td> </tr> <tr> <td></td> <td></td> <td>Outside</td> <td>01</td> <td>60</td> </tr> <tr> <td>2.</td> <td>Liquid Paint</td> <td></td> <td></td> <td></td> </tr> <tr> <td>a.</td> <td>Epoxy (primer)</td> <td>Outside</td> <td>01</td> <td>30</td> </tr> <tr> <td>b.</td> <td>P.U. Paint (finish paint)</td> <td>Outside</td> <td>02</td> <td>25 (each)</td> </tr> <tr> <td>c.</td> <td>Hot oil resistant paint</td> <td>Inside</td> <td>01</td> <td>35</td> </tr> </tbody> </table> <p>4. The two coats shall be of oil and weather-resistant nature with final coat as flossy and non-fading paint of shade RAL 6037 (Green).</p> <p>5. The dry film thickness shall not exceed the specified minimum dry film thickness by more than 25%.</p> <p>6. Any damaged part shall be cleaned to bare metal with an area extending 25 mm around its boundary. A priming coat shall be immediately applied followed by full paint finish equal to that originally applied and extending 50 mm around the perimeter of the original</p>	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	01	30			Outside	01	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
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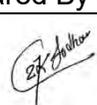
		<p>damage. The repainted surface shall present a smooth surface which shall be obtained by carefully chamfering the paint edges before and after priming.</p> <p>7. Painting shall not affect by weather changes & performance against pilling out or fading etc. to be guaranteed for 5 Years.</p>
5.24	RADIO INTEREFENCE	When operated at voltages up to 12.5% in excess of the normal system rating, transformers shall be substantially free from partial discharges (i.e. corona discharges in either internal or external insulation) which are likely to cause interference with radio or telephone communication.
5.25	OVERLOAD CAPACITY	The transformer shall be suitable for loading as per IEC 60076 / IS 2026 Part-7 & 8
5.26	PACKING	Transformers shall be delivered filled with oil and supplied with all accessories mounted. Screws and bolts shall be thoroughly tightened to ensure no leakage of oil.
5.27	FITTINGS	<p>The following standard fittings shall be provided:</p> <ol style="list-style-type: none"> Two earthing terminals with earthing symbol \perp for body earthing. Air Release Device. Thermometer Pocket with cap. Inspection Cover. Drain cum Sampling Valve (Double Flanged) and (0.75 inch nominal size thread, IS 554) with locking arrangement and a valve cover made of M.S.steel. Non Return Valve. Pressure relief device. DGPT2 relay. HV and LV cable Boxes. HV and LV Bushings. Terminal Connectors for HV/LV side (palm connector, suitable bimetallic washer, Al bus-bar and Al lugs). HV and LV Gland plates (Non-Magnetic) (with Brass glands). Prismatic Oil level Gauge. Lifting lugs for the top cover, complete transformer as well as for core and winding assembly. Pulling Lugs. Jacking Pads. Stiffener Angle. 2 Base channels. 4 No. Bidirectional rollers with locking arrangement. Marking Plates as asked in clause 6. Temperature indicator with alarm & trip, and Winding Temperature Indicator. PRD relay shall be provided with weather proof canopy to avoid any water seepage inside relay.
5.28	WINDING TEMPERATURE INDICATOR (WTI)	<ol style="list-style-type: none"> WTI shall be provided in one winding of LV. WTI 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. WTI shall operate a remote alarm and trip in the event of attaining the predefined temperature.

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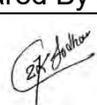
		4. In addition, pocket with heater coil along with Resistance Temperature Indicator (RTD) shall be provided for WTI and OTI. CT for RTD for winding hot spots shall be provided.
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5.32	MARSHALLING BOX AND PROTECTION	<ol style="list-style-type: none"> 1. Marshalling Box of suitable size, made up of Mild Steel and with theft proof locking arrangement shall be provided. 2. Marshalling box shall have IP 55 protection. 3. Marshalling Box shall have provision for wiring the WTI, OTI, PRV, DGPT relay and LT neutral CT terminals. The terminals shall be provided as per table below. Standard TB links along with terminal markings will be provided separately at the time of drawing approval stage. <table border="1" style="width:100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr style="background-color: #d9e1f2;"> <th style="width:60%;">Element</th> <th style="width:20%;">Alarm</th> <th style="width:20%;">Trip</th> </tr> </thead> <tbody> <tr> <td>Oil Temperature Indicator</td> <td>NO,NC,COM</td> <td>NO,NC,COM</td> </tr> <tr> <td>Winding Temperature Indicator LT Side</td> <td>NO,NC,COM</td> <td>NO,NC,COM</td> </tr> <tr> <td>PRV</td> <td>NO,NC,COM</td> <td></td> </tr> <tr> <td>LT Neutral CT Secondary Terminal</td> <td>N</td> <td></td> </tr> <tr> <td>DGPT2 relay</td> <td>NO,NC,COM</td> <td>NO,NC,COM</td> </tr> <tr> <td>Spare TB</td> <td>4 No.</td> <td></td> </tr> </tbody> </table> <ol style="list-style-type: none"> 4. WTI/OTI meter shall be wired/ installed in the marshalling box. 5. 10 core PVC wire (4 sq.mm Cu FRLS PVC stranded panel wires) shall be used to terminate connections from CTs at LV side to the Marshalling box. 6. All Terminal in marshalling box should be of Connectwell / Elmex make, CDTS type, Droppable, 1.1 kV rated, with ring type termination. Marshalling box should have Monsoon protection. All CT connection should be through ring type lugs on both sides. Conservator and Buchholz are applicable for all ratings of Transformers. 7. Plastic ferrules engraved with black letters shall be used to mark the wires in the marshalling box. 8. Wiring in Marshalling box shall be done by 2.5 sq.mm Cu FRLS PVC stranded panel wires. 9. All the cables and conduits between the transformer and control cabinet shall be included in the scope of supply by the bidder. 10. All Terminal in marshalling box should be of Connectwell / Elmex make, CDTS type, Droppable, 1.1 kV rated, with ring type termination. 	Element	Alarm	Trip	Oil Temperature Indicator	NO,NC,COM	NO,NC,COM	Winding Temperature Indicator LT Side	NO,NC,COM	NO,NC,COM	PRV	NO,NC,COM		LT Neutral CT Secondary Terminal	N		DGPT2 relay	NO,NC,COM	NO,NC,COM	Spare TB	4 No.	
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DGPT2 relay	NO,NC,COM	NO,NC,COM																					
Spare TB	4 No.																						

5.33	MAKE OF MAJOR COMPONENTS & RAW MATERIALS	<p>The BA shall procure the following constituent items from the designated vendors as follows:</p> <table border="1" style="width:100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr style="background-color: #d9e1f2;"> <th style="width:10%;">S.no</th> <th style="width:40%;">RAW MATERIAL/EQUIPMENT</th> <th style="width:50%;">MAKE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Transformer Raw Materials</td> <td></td> </tr> <tr> <td>a)</td> <td>Copper</td> <td>M/S Sterlite, M/S Hindustan Copper, M/S Hindalco or equivalent on approval of bidder.</td> </tr> <tr> <td>b)</td> <td>Core</td> <td>M/S AK Steels, POSCO, Kawasaki/ JFE, Nippon Steel or equivalent on approval of bidder.</td> </tr> <tr> <td>c)</td> <td>Insulation paper</td> <td>Raman Boards- Mysore, Senapathy Whiteley – Bangalore or equivalent on approval of bidder.</td> </tr> <tr> <td>d)</td> <td>Transformer Oil</td> <td>Savita, Apar, Gandhar or equivalent on approval of bidder.</td> </tr> </tbody> </table>	S.no	RAW MATERIAL/EQUIPMENT	MAKE	1	Transformer Raw Materials		a)	Copper	M/S Sterlite, M/S Hindustan Copper, M/S Hindalco or equivalent on approval of bidder.	b)	Core	M/S AK Steels, POSCO, Kawasaki/ JFE, Nippon Steel or equivalent on approval of bidder.	c)	Insulation paper	Raman Boards- Mysore, Senapathy Whiteley – Bangalore or equivalent on approval of bidder.	d)	Transformer Oil	Savita, Apar, Gandhar or equivalent on approval of bidder.
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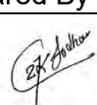
		e)	Gaskets & Corks	Nu Cork, Anchor Corks or equivalent on approval of bidder.																														
		f)	Steel For Tank	M/S TISCO, M/S SAIL, M/S Bhushan Steel, M/S ISSCO, M/S RINL, M/S Jindal Steel or equivalent on approval of bidder.																														
5.35	INSULATING PAPER AND INSULATING PRESSBOARD	<p>Bidder has to provide all test certificates from original manufacturers & relevant sourcing documents. BA shall also have shot blasting facility.</p> <ol style="list-style-type: none"> Inter layer insulation both for HV and LV windings shall be Epoxy diamond dotted Kraft paper and compressed pressboard of make (refer Clause no.5.32) subject to approval of TPC. Primary and secondary windings shall be constructed from high-conductivity (copper conductors), Double Paper Covered (DPC) copper conductor with min. 30% overlap per layer of paper & TPC with 25% overlap per layer. 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. Kraft paper and Pressboard should be of class A (105°C) insulation material. All spacers, axial wedges / runners used in windings shall be made of pre-compressed solid pressboard. All axial wedges/runners shall be properly milled to dovetail shape so that they pass through the designed spacers freely. 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. Kraft paper self-adhesive tape to be used for bonding of insulating paper layer, spanner and paperboards that are immersed in the oil filled transformer. Below required values could be verified if required at any stage of the inspection and it should fulfill the requirement as per below table: <table border="1" data-bbox="438 1113 1554 1638"> <thead> <tr> <th>Characteristics</th> <th>Kraft Paper</th> <th>Pressboard (all Sizes)</th> </tr> </thead> <tbody> <tr> <td>1. Dimension</td> <td>As specified by bidder with ± 5% tolerance.</td> <td>As specified by bidder with tolerance as per IS1576.</td> </tr> <tr> <td>2. Apparent Density</td> <td>>0.80 g/cm³</td> <td>as per IS 1576 w.r.t Thickness</td> </tr> <tr> <td>3. pH of Aqueous extract</td> <td>6-8%</td> <td>6-8%</td> </tr> <tr> <td>4. Electrical strength i) in air ii) In Oil</td> <td>7KV/mm -----</td> <td>12KV/mm 35KV/mm</td> </tr> <tr> <td>5. Ash content</td> <td>Maximum 1%</td> <td>Maximum 0.7</td> </tr> <tr> <td>6. Moisture content</td> <td>Maximum 8%</td> <td>Maximum 8%</td> </tr> <tr> <td>7. Oil absorption</td> <td>-----</td> <td>Minimum 9%</td> </tr> <tr> <td>8. Heat stability</td> <td>As per IS 9335-part 3</td> <td>As per IS 1576</td> </tr> <tr> <td>9. Tear index</td> <td>As per IS 9335-part 3</td> <td>As per IS 1576</td> </tr> </tbody> </table> <p>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 :</p>			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/cm ³	as per IS 1576 w.r.t Thickness	3. pH of Aqueous extract	6-8%	6-8%	4. Electrical strength i) in air ii) In Oil	7KV/mm -----	12KV/mm 35KV/mm	5. Ash content	Maximum 1%	Maximum 0.7	6. Moisture content	Maximum 8%	Maximum 8%	7. Oil absorption	-----	Minimum 9%	8. Heat stability	As per IS 9335-part 3	As per IS 1576	9. Tear index	As per IS 9335-part 3	As per IS 1576
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1. Substance (Grammage) (g/m³)
2. Compressibility
3. Tensile strength
4. Conductivity of water extract
5. Shrinkage in air
6. Flexibility
7. Cohesion between plies 1.
8. Elongation
9. Air permeability

Bidder shall provide the below details in below table :

Sr. No.	Description	Unit	As furnished by bidder
1	DPC Paper for HV and LV conductor.		
2	Type of DPC Paper		
3	Make of DPC Paper		
4	Thickness DPC Paper	mm	
5	Percentage Overlapping (not less than 60%)	%	
6	Type of paper for interlayer insulation		
7	Make of paper for interlayer insulation		
8	Thickness of Paper for Interlayer Insulation	mm	
9	Type of Paper for Insulation Between HV and LV winding		
10	Make of Paper for Insulation Between HV and LV winding		
11	Thickness of Paper for Insulation Between HV and LV winding (for all sizes)	mm	
12	Type of Pressboards used for Insulation Between HV and LV winding		
13	Make of Pressboards used for Insulation Between HV and LV winding		
14	Thickness of Pressboards for Insulation Between HV and LV (all size)	mm	
15	Type of Paper used for insulation between core and LV		
16	Make of Paper used for insulation between core and LV		
17	Thickness of Paper used for insulation between core and LV (All sizes)	mm	
18	Type of Pressboard used for insulation between core and LV		
19	Make of Pressboard used for insulation between core and LV		
20	Thickness of Pressboard used for insulation between core and LV (All sizes)	mm	
21	Material used for top and bottom yoke insulation		

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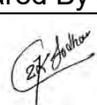
		22	Make of material used for top and bottom yoke insulation		
		23	Thickness of material used for top and bottom yoke insulation	mm	
		24	Type of material used for spanner, wedge, and Axial for insulation.		
		25	Thickness of material used for spanner, wedge, and Axial for insulation.	mm	

6.0 NAME PLATE AND MARKING

6.1	MARKING PLATES	<p>1. <u>Name Plate (Rating) Plate :</u> A rating plate shall be fitted to each transformer in a visible position and shall carry all the information as specified in clause no. 6.2</p> <p>2. <u>Terminal Marking Plate :</u></p> <ul style="list-style-type: none"> • The terminal marking plate shall be provided which shall be strictly in accordance with figure 4 of IS 1180-Part 1: 2014. This plate may be combined with the rating plate or can be provided separately. • Value of short circuit impedance on extreme tapping and on principal tapping and indication of winding to which impedance is related has to be displayed additionally. <p>3. <u>Details Plate:</u> A separate plate of size 125 mm x 125 mm shall be provided having following details:</p> <ul style="list-style-type: none"> • Name of the firm. • Serial No. • Rating of transformer. • Order no. and date. • Date of dispatch. <p>4. <u>Guarantee Plate:</u> A separate warranty plate made of Stainless Steel with following clause written on it.</p> <p style="text-align: center;">“THE EQUIPMENT GUARANTEED UPTO A PERIOD OF 48 MONTHS FROM THE DATE OF COMMISSIONING OR 60 MONTHS FROM THE DATE OF LAST SUPPLY”</p> <p>All the plates described above (clause 1 to 4) should be as followings:</p> <table border="1" data-bbox="505 1394 1330 1551" style="margin-left: auto; margin-right: auto;"> <tr> <td>Material</td> <td>Stainless Steel</td> </tr> <tr> <td>Thickness</td> <td>1 mm</td> </tr> <tr> <td>Engraving</td> <td>The letters on the rating plate shall be engraved black on the white/silver back ground.</td> </tr> <tr> <td>Fixing</td> <td>Fixing screws shall be of stainless steel.</td> </tr> </table> <p>5. <u>Danger Plate:</u> Danger notice shall have red lettering on a white background on a plate as specified in IS: 2551 – 1982.</p>	Material	Stainless Steel	Thickness	1 mm	Engraving	The letters on the rating plate shall be engraved black on the white/silver back ground.	Fixing	Fixing screws shall be of stainless steel.
Material	Stainless Steel									
Thickness	1 mm									
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		<p>6. BIS Certification Mark: The Bidder is required to get approval from BIS and display BIS mark on the name plate.</p> <p>7. BEE LABEL: A label shall be affixed on the front of the distribution transformer near the name plate, so as to be prominently visible. The label shall be non-detachable weather proof type with the following particulars shall be displayed on its label, namely:</p> <ol style="list-style-type: none"> 1. the logo of the Bureau of Energy Efficiency 2. that the equipment is a distribution transformer 3. that it is an oil filled, naturally cooled type 4. name of the manufacturer and brand 5. Capacity in KVA as tested 6. Voltage is up to 11 KV 7. Total losses at 50% loading in watts 8. Total losses at 100% loading in watts 9. Star level 10. Model and year of manufacturing. 11. Bureau's authorisation number <p>8. Control Circuit drawing Plates:</p> <ul style="list-style-type: none"> • Engraved drawing for control circuit unit shall be available on Marshalling box. <p>The design, colour, size and content of label shall be as specified in the schedule annexure IV.</p>
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		<p>9. TATA power logo (30 X 30) cm to be provided</p> <p>Relationship between the two marks- size</p> <p>The Tata and Tata Power Marks are always used in conjunction with each other, never appearing in isolation on Tata Power communication.</p> <p>The height of the letter T of Tata (T-height) is the basic measure for all sizes and proportions.</p> <p>The rounded measure 2T in height, is separated from the Tata lettering by a distance of 1/2T.</p> <p>The T height of both, the Tata and the Tata Power Marks is to be the same, except in exceptional cases on approval from the Corporate Communications team.</p>  <p>Centre aligned - Stacked (Preferred)</p> <p>Relationship between the two marks- positioning</p> <p>The two marks can appear stacked, which is the preferred placement, or linear, by the side of one another.</p> 
<p>6.2</p>	<p>NAME PLATE DETAILS</p>	<p>The name plate shall be strictly as per IS 1180: 2014 (figure 1). Additionally, following points shall be displayed :</p> <ol style="list-style-type: none"> Actual no load losses of transformer. Actual total losses of transformer at 50% load and 100% load. Standard mark (BIS certification). For Tata Power, Mumbai - "PROPERTY OF Tata Power Company" shall be written in bold letters. PO number with date has to be mentioned. Overall dimensions of the transformer.
<p>6.3</p>	<p>MARKING</p>	<ol style="list-style-type: none"> All transformers shall have HV phase windings marked in both, the terminal boards inside the tank and outside with capital letter 1U, 1V, 1W. The LV winding for the same phase shall be marked by corresponding small letter 2u, 2v, 2w. The neutral point terminal shall be indicated by the letter 2n. The markings shall be done by steel strips in which marks had been engraved in black colour. Colour marking of the bushings shall be done.

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		4. On the top cover of tank and the core channel, Manufacturer's name and Manufacturer's serial no. shall be engraved.
7.0	TESTS	All routine, acceptance & type tests shall be carried out in accordance with the IS 2026 and IS 1180: Part-1 (2014). All routine & type tests shall be witnessed by the TATA POWER/his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted on the Distribution Transformers in addition to others specified in IS/IEC standards.
7.1	TYPE TEST	<ol style="list-style-type: none"> 1. Lightning Impulse Test [As per IS 2026 (Part 3)]. 2. Temperature Rise Test [As per IS 2026 (Part 2)]. NOTE: Maximum measured total loss (No load at Rated excitation load loss at maximum current tap converted to 75°C reference temperature) at 100 percent loading shall be supplied during temperature rise test. 3. Short Circuit Withstand test [As per IS 2026 (Part 5)]. NOTE: Routine tests before and after short circuit test shall be conducted as per IS 2026(Part 1). 4. Pressure Test [As per IS 1180: Part 1 (2014)]. 5. Determination of sound levels [IS 2026 (part 10)]. 6. No load current at 112.5% voltage 7. BDV and moisture content of oil in transformer (IS 335). 8. Magnetic balance test. 9. Measurement of Zero-phase sequence impedance. 10. Measurement of Harmonics of no-load current. <p>Note: - Out of the above mention type test, the tests under sr. No. 1, 2, 3 and 4 shall be conducted at CPRI/ERDA labs and the balance shall be acceptable as in- house tests.</p>
7.2	ROUTINE TEST	<ol style="list-style-type: none"> 1. Measurement of Winding Resistance at each tap [As per IS 2026 (Part 1)]. 2. Measurement of voltage ratio, check of voltage displacement, polarity, phase sequence and vector group [As per IS 2026 (Part 1)]. 3. Measurement of short circuit impedance (principal tapping, when applicable) and load loss at 50% and 100% load [As per IS 2026 (Part 1)]. 4. Measurement of insulation resistance [As per IS 2026 (Part 1)]. 5. Induced over voltage withstand test [As per IS 2026 (Part 3)]. 6. Separate Source voltage withstand test [As per IS 2026 (Part 3)]. 7. Pressure test [As per IS 1180: Part 1 (2014)]. 8. Oil leakage test [As per IS 1180: Part 1 (2014)]. 9. Measurement of no load losses and magnetizing current at rated frequency and 90%, 100% and 112.5% of rated voltage. [As per IS 2026 (Part 1)]. 10. Vacuum withstand test on tanks and radiators. 11. All CT's and resistance of image coil for WTI shall be checked for ratio test, polarity and knee point voltage. 12. Oil sample Test.

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7.3	ACCEPTANCE TEST	<ol style="list-style-type: none"> a. Temperature Rise Test (on one unit of every lot offered for inspection for each rating). b. Oil leakage test for acceptance shall be conducted at pressure of 0.35kg/sq.cm for one hour. c. The painted surface shall pass the Cross Adhesion Test, Impact Test and Hardness Test. d. Checking of weight, dimensions, fitting and accessories, tank sheet thickness, oil quantity, material finish and workmanship, physical verification of core coil assembly and measurement of flux density on one unit of each rating of the offered lot with reference to the GTP and contract drawings. e. Vector group test f. Calibration of WTI and OTI. g. 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 TATA POWER's representative at the place of manufacture before dispatch without any extra charges. The testing shall be carried out in accordance with IS: 1180 and IS: 2026. h. Device Trails & tests for 1MVA & above (PRV trip, WTI Alarm, WTI trip, OTI trip and OTI Alarm). i. Tata Power, Mumbai shall conduct - Magnetic Balance Test on HV & LV side, with magnetizing current HV and LV side.
8.0	TYPE TEST CERTIFICATES	<p>The Bidder shall furnish the type test certificates of the 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 TATA POWER.</p>
9.0	PRE-DESPATCH INSPECTION	<ol style="list-style-type: none"> 1. Equipment shall be subject to inspection by a duly authorized representative of the TATA POWER. Inspection may be made at any stage of manufacture at the option of the purchaser and the equipment if found unsatisfactory as to workmanship or material, the same is liable to rejection. 2. Bidder shall always grant free access to the places of manufacture to TATA POWER's representatives when the work is in progress. Inspection by the TATA POWER or its authorized representatives shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications. 3. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TATA POWER. following documents shall be sent along with material: <ol style="list-style-type: none"> a. Test reports b. MDCC issued by TATA POWER c. Invoice in duplicate d. Packing list e. Drawings & catalogue f. Guarantee / Warrantee card g. Delivery Challan. h. Other Documents (as applicable) 4. 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

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		<p>tested in the presence of TATA POWER's representative. 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 TATA POWER. The bidder shall furnish following documents along with their offer in respect of the raw materials:</p> <ol style="list-style-type: none"> Invoice of supplier. Mill's certificate Packing List. Bill of Landing Bill of entry certificate by custom. <ol style="list-style-type: none"> To ensure about the quality of transformers, the inspection shall be carried out by the TATA POWER's representative at following two stages: <ol style="list-style-type: none"> Online anytime during receipt of raw material and manufacture/assembly whenever the TATA POWER desires. At finished stage i.e. transformers are fully assembled and are ready for dispatch. The stage inspection shall be carried out as per Annexure-I. 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 TATA POWER 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. The inspection shall be done as per the format given in Annexure – II. During the inspection, the bidder shall also furnish the information regard various components as per Annexure – III. 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 TATA POWER at the earliest after receipt of offer for pre-delivery inspection. All tests and inspection shall be carried out at the place of manufacture unless otherwise specifically agreed upon by the manufacturer and TATA POWER at the time of purchase. The manufacturer shall offer the inspector representing the TATA POWER 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. The bidder shall provide all services to establish and maintain quality of workmanship in his works and that of his sub-contractors to ensure the mechanical / electrical performance of components, compliance with drawings, identification and acceptability of all materials, parts and equipment as per latest quality standards of ISO 9000. The TATA POWER 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. TATA POWER 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 TATA POWER have every right to reject the entire lot or penalize the bidder, which may lead to blacklisting, among other things. TATA POWER also reserves the right to inspect the tank of transformer before surface preparation and painting. The same shall be informed to TATA POWER accordingly.
10.0	INSPECTION AFTER RECEIPT AT STORE	<ol style="list-style-type: none"> The material received at the TATA POWER store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection.

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		<ol style="list-style-type: none"> 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 TATA POWER. 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. 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. 5. TATA POWER 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. 6. TATA POWER 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 TATA POWER either at the manufacturer's works when they are offered in a lot for supply or randomly from the supplies already made to TATA POWER stores. The findings and conclusions of these tests shall be binding on the bidder.
11.0	GUARANTEE:	<ol style="list-style-type: none"> 1. Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract. 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. 2. Bidder shall be liable to undertake to replace/rectify such defects at his own costs within mutually agreed timeframe and to the entire satisfaction of the TATA POWER, failing which the TATA POWER will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the TATA POWER's own charges (@ 20% of expenses incurred), from the Bidder or from the "Security cum Performance Deposit" as the case may be. 3. In case of Distribution transformer fails within the guarantee period TATA POWER will immediately inform the Bidder who shall take back the failed Distribution 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. 4. 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.
12.0	PACKING	<ol style="list-style-type: none"> 1. Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit. 2. No single use plastic to be used in packaging. The packaging material shall be environmentally friendly & recyclable.
13.0	TENDER SAMPLE	NA

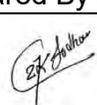
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14.0	QUALITY CONTROL	<p>The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought 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. TATA POWER's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.</p> <p>The following information shall necessarily be submitted with the bid:</p> <ol style="list-style-type: none"> 1. List of important raw materials, names of sub-suppliers for raw materials, standards to which raw material is tested and the copies of test reports of the tests carried out on raw materials in presence of Bidder's representatives. 2. List of manufacturing facilities available, level of automation achieved and the areas where manual process exists. 3. List of areas in manufacturing process where stage inspections are normally carried out for quality control and details of these tests and inspections 4. List of testing equipment for final testing with valid calibration reports. Manufacturer shall possess 0.1 class instruments for measurement of losses. 5. QAP withhold points for Tata Power inspection.
15.0	MINIMUM TESTING FACILITIES	<p>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.</p>
16.0	MANUFACTURING ACTIVITIES	<p>The successful bidder will have to submit GTP & Drawing with 15 days from placement of order/OLA for approval. The date of Code -2/ Code-1 approval given by TATA Power will be treated as first day for assessment of LD (if applicable).</p>
17.0	SPARES, ACCESSORIES AND TOOLS	<ol style="list-style-type: none"> 1. 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 part listed at the time of award of contract and these parts shall be supplied as a part of definite works. The Purchaser may order additional spares at any time during the contract period at the rates stated in the Contract document. 2. Bidder shall give an assurance that the reparability of transformer, 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. 3. 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 plant and must be suitably marked and numbered for identification.
18.0	DRAWINGS AND DOCUMENTS	<p>A. Following drawings and documents shall be prepared based on TATA POWER specifications and statutory requirements and shall be submitted with the bid:</p> <ol style="list-style-type: none"> 1. Completely filled in Technical Particulars (General Technical Particulars, General Technical Requirements, Additional Details, and Fittings as per clause 5.29). 2. Description of the transformer and all components including brochures. 3. General arrangement for Transformer. 4. Foundation plan.

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		<p>5. Bill of material. 6. Experience List 7. Type test certificates.</p> <p>B. Drawings / documents to be submitted after the award of the contract are as under:</p> <p>1. <u>List of Drawings/Parameters to be submitted:</u></p> <ol style="list-style-type: none"> 1. Technical Parameters as asked in Specification (General Technical Particulars, General Technical Requirements, Additional Details, Fittings, Type test Reports and Routine test certificates of bought out accessories). 2. General Arrangement Drawing of the Transformer (Front view, Top view and both sides view. Complete list of fittings to be displayed and quantities to be mentioned with the drawing). 3. Internal Core arrangement drawing. 4. Internal Core-coil assembly drawing. 5. Marking plates and Markings (as mentioned in clause 6) 6. Foundation Plan drawing. 7. HV and LV bushings drawing (with internal view and metal parts) 8. HT connector / LT connector (palm connector), Aluminium Busbar and Al lugs drawings. 9. HV and LV Box drawing. 10. Gland Plate for HV/LV box. 11. Prismatic oil level gauge drawing. 12. Silica Gel Breather drawing. 13. CT Terminal Box drawing with internal wiring arrangement. 14. Gland plate of CT Terminal. 15. Test Certificates. 16. Installation Instructions. 17. Transport/Shipping dimension drawing. 18. QA/QC plan. <p>2. <u>List of Calculations to be submitted:</u> All the calculations shall be step by step showing the use of formulas and other practical considerations. Concise calculations in table or excel sheet shall not be accepted. Also, the reference (only standard sources as IS, IEC or any such standard is acceptable) of the formulas shall be mentioned.</p> <ol style="list-style-type: none"> 1. Resistance Calculation (75 deg. C) 2. Load Losses Calculation (at 75 deg. C) 3. No load Losses. 4. Stray Losses. 5. Weight of Copper (Bare and with Insulation also). 6. Weight of Core. 7. Flux Density calculations. 8. Current Density Calculations. 9. Short Circuit withstand. 10. Temperature Rise Calculations. 11. Cooling Calculations showing cooling with tank and radiators separately with no. of radiators and fins mentioned specifically. 12. Lifting lugs. <p>3. <u>Additional Documents to be submitted :</u></p>
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1. List of raw materials as well as bought out accessories and the names of sub-suppliers selected from those furnished along with offer.
2. Type test certificates of the raw materials and bought out accessories.
3. The successful Bidder shall submit the **routine test certificates of bought out accessories** and central excise passes for raw material at the time of routine testing.

Note :

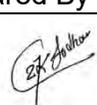
- i. All the documents & drawings shall be in English language.
- ii. After the receipt of the order, the successful bidder will be required to furnish all relevant drawings/parameters/calculation to TATA POWER for approval.

C. Instruction Manuals:

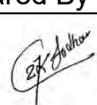
Bidder shall furnish softcopies of nicely bound manuals (In English language) covering erection and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices.

19.0 GUARANTEED TECHNICAL PARTICULARS

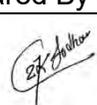
Sr.No	Description	Unit	As Specified by TPCL	As Furnished by Bidder
1	Continuous Rating	kVA	315/400/500/630/800/1000/ 1250/1600/2000	
2	Type of Transformer		Hermitically sealed Type	
3	Name of Manufacturer		To be furnished by Bidder	
4	Place of Manufacture		To be furnished by Bidder	
5	Voltage ratio	kV	11/0.415 or 22/0.415 or 6.6/0.415	
6	Vector group		Dyn-11	
7	Type of cooling		KNAN	
8	Class of Insulation		Class A	
9	Winding Material		Copper	
10	Core material used and Grade			
10.1	Thickness		To be furnished by Bidder	
10.2	Grade		M3 or better	
10.3	Flux Density at normal voltage	Tesla	1.69 T Max	
10.4	Over fluxing without saturation	Tesla	1.9 T Max	
11	Maximum temperature rise of:			
11.1	Windings by resistance method	Deg. C	45° C	
11.2	Oil by thermometer	Deg. C	40° C	
12	Magnetizing (no-load) current at:			
12.1	90% Voltage	%	To be furnished by Bidder	
12.2	100% Voltage	%	To be furnished by Bidder	
12.3	112.5% Voltage	%	To be furnished by Bidder	

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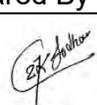
13	Resistance of windings at 20 deg. C			
13.1	HV windings	Ohms/p hase	To be furnished by Bidder	
13.2	LV windings	Ohms/p hase	To be furnished by Bidder	
14	No Load losses	Watts	To be furnished by Bidder	
15	Load losses at 50%loading at 75° C	Watts	To be furnished by Bidder	
16	Load losses at 100% loading at 75° C	Watts	To be furnished by Bidder	
17	Total losses at 100%load at 75° C	Watts	To be furnished by Bidder	
18	Total losses at 50% load at 75° C	Watts	To be furnished by Bidder	
19	Current density used for:			
19.1	HV winding	Amp./m m ²	< or = 2.5	
19.2	LV winding	Amp./m m ²	< or = 2.5	
20	Clearances			
20.1	Core and LV	mm	To be furnished by Bidder	
20.2	LV and HV	mm	To be furnished by Bidder	
20.3	HV Phase to phase	mm	To be furnished by Bidder	
20.4	Between HV winding and Yoke	mm	To be furnished by Bidder	
20.5	Between LV winding and Yoke	mm	To be furnished by Bidder	
20.6	Between yoke and inside of tank to cover	mm	To be furnished by Bidder	
20.7	Between yoke and bottom	mm	To be furnished by Bidder	
20.8	Any point of winding to tank	mm	To be furnished by Bidder	
21	Efficiency at 75 deg. C			
21.1	Unity P.F.			
	125% load	%	To be furnished by Bidder	
	100% load	%	To be furnished by Bidder	
	75% load	%	To be furnished by Bidder	
	50% load	%	To be furnished by Bidder	
	25% load	%	To be furnished by Bidder	
21.2	0.8 P.F.			
	125% load	%	To be furnished by Bidder	
	100% load	%	To be furnished by Bidder	
	75% load	%	To be furnished by Bidder	
	50% load	%	To be furnished by Bidder	
	25% load	%	To be furnished by Bidder	
22	Regulation at :			

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22.1	Unity P.F. at 75 deg. C	%	To be furnished by Bidder	
22.2	0.8 P.F. at 75 deg. C	%	To be furnished by Bidder	
23	% Impedance at 75 deg. C	%	To be furnished by Bidder	
24	Power frequency voltage withstand test			
24.1	HV for 1 minute	kV	28 (for 11kV) 50 (for 22kV) 20 (for 6.6kV)	
24.2	LV for 1 minute	kV	3	
25	Over potential Test (Double voltage and double frequency for 1 minute)	V	830	
26	Impulse voltage withstand test (HV)	kVp	75 (for 11kV) 125 (for 22kV) 60 (for 6.6kV)	
27	Mass of :			
27.1	Core lamination (minimum)	kg	To be furnished by Bidder	
27.2	Windings (minimum)	kg	To be furnished by Bidder	
27.3	Tank and fittings	kg	To be furnished by Bidder	
27.4	Oil	kg	To be furnished by Bidder	
27.5	Oil quantity (minimum)	Ltr	To be furnished by Bidder	
27.6	Total weight	kg	To be furnished by Bidder	
28	Oil Data:			
28.1	Quantity for first filling (minimum)	Ltr	To be furnished by Bidder	
28.2	Grade of oil used		To be furnished by Bidder	
28.3	Marker's name		To be furnished by Bidder	
28.4	BDV at the time of filling	kV	To be furnished by Bidder	
29	Transformer:			
29.1	Overall length × Breadth × Height	mm X mm X mm	To be furnished by Bidder	
29.2	Thickness of plates for			
29.2.1	Side plate (min.)	mm	5	
29.2.2	Top and bottom Plate (min.)	mm	6	
31	Radiators:			
31.1	Heat dissipation by tank walls excluding top and bottom		To be furnished by Bidder	
31.2	Heat dissipation by cooling Radiator		To be furnished by Bidder	
31.3	Size and thickness of sheet		To be furnished by Bidder	
31.4	No of bank/fins		To be furnished by Bidder	
32	Inter layer insulation provided in design for In between all layer		To be furnished by Bidder	
33	Insulation materials provided			

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33.1	For conductors			
33.1.1	HV		To be furnished by Bidder	
33.1.2	LV		To be furnished by Bidder	
33.1.3	Core		To be furnished by Bidder	
34	Material and size of the wire used			
34.1	HV Conductor			
34.1.1	Size	mm	To be furnished by Bidder	
34.1.2	Area of cross section	Sq.mm	To be furnished by Bidder	
34.2	LV Conductor			
34.2.1	Strip size	mm	To be furnished by Bidder	
34.2.2	No. of conductors in parallel	Nos.	To be furnished by Bidder	
34.2.3	Total area of cross section	Sq.mm	To be furnished by Bidder	
35	Whether the name plate gives all particulars as required in specifications	YES/ N O	To be furnished by Bidder	
36	Particulars of bushings HV			
36.1	Manufacturer's name		To be furnished by Bidder	
36.2	Compliance to standard IS 8603		To be furnished by Bidder	
36.3	Rating as per IS		To be furnished by Bidder	
36.4	Dry power frequency voltage withstand test		To be furnished by Bidder	
36.5	Wet power frequency voltage withstand test		To be furnished by Bidder	
37	Particulars of bushings LV			
37.1	Manufacturer's name		To be furnished by Bidder	
37.2	Compliance to standard IS-3347		To be furnished by Bidder	
37.3	Rating as per IS		To be furnished by Bidder	
37.4	Dry power frequency voltage withstand test		To be furnished by Bidder	
37.5	Wet power frequency voltage withstand test		To be furnished by Bidder	
38	Whether the offer conforms to the limits of impedance mentioned in specification		To be furnished by Bidder	
39	Whether the offer conforms the limits of temperature rise mentioned in specification		To be furnished by Bidder	
40	Whether the losses of transformers offered are within the limits specified		To be furnished by Bidder	
41	Whether the transformer offered is already type tested for design and test reports enclosed		To be furnished by Bidder	

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11kV/415V & 22kV/415V hermetically sealed
Ester Oil Filled Distribution Transformer
KNAN

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ADDDITIONAL DETAILS:

Sl. No.	Description	Unit	As Specified by TPCL	As furnished by bidder
1	Core grade		M3 or Better	
2	Thickness of core	mm	To be furnished by Bidder	
3	Core diameter	mm	To be furnished by Bidder	
4	Gross core area	Sq.cm	To be furnished by Bidder	
5	Net core area	Sq.cm	To be furnished by Bidder	
6	Flux density (calculated)	Tesla	1.69 T Max	
7	Mass of core	Kg	To be furnished by Bidder	
8	Loss per Kg of core at the above specified flux density	Watt	To be furnished by Bidder	
9	Core window height	mm	To be furnished by Bidder	
10	Center to center distance of the core	mm	To be furnished by Bidder	
11	No. of LV Turns		To be furnished by Bidder	
12	No. of HV Turns		To be furnished by Bidder	
13	Size of LV conductor bare/covered	mm	To be furnished by Bidder	
14	No. of parallels		To be furnished by Bidder	
15	Size of HV conductor bare/covered	mm	To be furnished by Bidder	
16	Current density of LV winding(calculated)	A/sq.mm	2.5 Max	
17	Current density of HV winding(calculated)	A/sq.mm	2.5 Max	
18	Wt. of the LV winding	Kg	To be furnished by Bidder	
19	Wt. of the HV winding	Kg	To be furnished by Bidder	
20	No. of LV coils/phase		To be furnished by Bidder	
21	No. of HV coils/phase		To be furnished by Bidder	
22	Height of LV winding	mm	To be furnished by Bidder	
23	Height of HV winding	mm	To be furnished by Bidder	
24	ID/OD of HV winding	mm	To be furnished by Bidder	
25	ID/OD of LV winding	mm	To be furnished by Bidder	
26	Thickness of the duct in LV winding	mm	To be furnished by Bidder	
27	Thickness of the duct in HV winding	mm	To be furnished by Bidder	
28	Thickness of the duct between HV and LV	mm	To be furnished by Bidder	

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29	Calculated Impedance	%	To be furnished by Bidder	
30	HV to earth creep age distance in oil	mm	To be furnished by Bidder	
31	LV to earth creep age distance in oil	mm	To be furnished by Bidder	

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

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ANNEXURE-I

PROFORMA FOR STAGE INSPECTION OF DISTRIBUTION TRANSFORMER

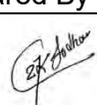
S No.	Particulars	Details
(A)	GENERAL INFORMATION:	
1	Name of firm	
2	Order No. and Date	
3	Details of offer	
a)	Rating	
b)	Quantity	
c)	Serial Numbers	
4	Details of last stage inspected lot:	
a)	Total quantity inspected	
b)	Serial Numbers	
c)	Date of stage inspection	
d)	Quantity offered for final inspection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

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

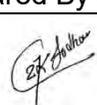
- a) At least 50% quantity has been tanked and
- b) Core coil assembly of further at least 30% of the quantity offered has been completed.
- c) Rest of quantity shall be in form of core assembly & coils.

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

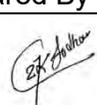
S No.	Particulars	As offered	As observed	Deviation and Remarks
(C)	<u>Inspection of Core:</u>			
	(I) Core Material			
	1) Manufacturer's characteristic certificate in respect of grade of lamination used. (Please furnish test certificate)			
	2) Thickness of core lamination			
	3) Remarks regarding Rusting and smoothness of core.			
	4) Whether laminations used for top and bottom yoke are in one piece.			
	(II) Core Construction:			
	(1) No. of steps			
	(2) Dimension of steps			

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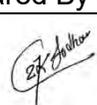
As offered:												
Step No	1	2	3	4	5	6	7	8	9	10	11	12
W mm												
T mm												
As found:												
Step No	1	2	3	4	5	6	7	8	9	10	11	12
W mm												
T mm												
(1)												
(2) Core Diameter (mm)												
(3) Total cross sectional area of core												
(4) Core length (leg center to leg center)												
(5) Window height.												
(6) Core height												
(7) Core weight only												
(D) 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 wire used for delta formation (mm)												
4) 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)												
5) Current density of winding material used for:												
a) HV												
b) LV												
6) Whether neutral formation on top.												
7) HV coils / Phase												
a) Number												

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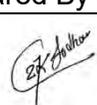
	b) Turns/coil			
	c) Total turns			
8)	LV coils /Phase			
	a) Number			
	b) Turns / coil			
	c) Total turns			
9)	Total weight of coils of			
	a) LV winding (Kg)			
	b) HV winding (Kg)			
(E)	INSULATION MATERIALS			
	(I) Material			
	1) Craft paper			
	a) Make			
	b) Thickness (mm)			
	c) Test certificate of manufacturer (enclose copy)			
	2) Press Board			
	a) Make			
	a) Thickness (mm)			
	b) Test certificate of manufacturer (enclose copy)			
	3) Material used for top and bottom yoke and insulation			
	(II) Type and Thickness of material used : (mm)			
	a) Between core and LV			
	b) Spacers			
	c) Interlayer			
	d) Between HV and LV winding			
	e) Between phases			
(F)	CLEARANCES: (mm)			
	(I) Related to core and winding			
	1) LV to core (radial)			
	2) Between Hv and LV (Radial)			
	3) (i) Phase to phase between HV conductor			
	(ii) Whether two nos. press board each of minimum 1mm thick provided to cover the tie rods.			
	4) Thickness of duct between HV and LV coil mm			
	(II) Between core – coil assembly and tank:			
	1) Between winding and body			
	a) Tank length wise			
	b) Tank breadth wise			
(G)	TANK :			
	(I) Construction Details:			
	1) Rectangular shape			
	2) Thickness of side wall (mm)			
	3) Thickness of top and bottom plate (mm)			
	4) Provision of sloping top cover towards HV bushing.			
	5) Tank internal dimensions (mm)			
	a) Length			
	b) Breadth			
	c) Height			
	h) On HV side			
	ii) On LV side			

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	(II) General Details :		
	1) Inside painted by oil corrosion resistant paint (please specify which type of coating done)		
	2) Gasket between top cover and tank		
	a) Material		
	i) Thickness (mm)		
	ii) Jointing over laps (mm)		
	3) Provision of lifting lugs:		
	a) Numbers		
	b) Either reinforced by welded plates edge wise below the lug up to re-enforcing angle of the tank done.		
	4) Pulling lug of MS plate		
	a) Nos.		
	b) Thickness (mm)		
	c) Whether provided on breadth side or length side		
	5) Provision of air release plug		
	6) Provision of hot dip galvanized GI Nuts Bolts with 1no. plain and 1no. spring washer.		
	7) Deformation of length wise 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.		
(H)	RADIATORS:		
	1) Corrugated type		
(K)	TERMINALS:		
	1) Material whether of Brass Rods/Tinned Copper.		
	a) HV		
	b) LV		
	2) Size (dia. In mm)		
	a) HV		
	b) LV		
	3) Whether SRBP tube / insulated paper used for formation of Delta on HV.		
(L)	BUSHINGS		
	1) Whether HV bushings mounted on top cover/ side walls.		
	a) HV		
	b) LV		
	2) Whether arrangement for studs for fitting of HV Bushing are in diamond shape (so that arcing horns are placed vertically.)		
	3) Position of mounting of LV bushings		
	4) Bushing Clearance: (mm)		
	a) LV to Earth		
	b) HV to Earth		
	c) Between LV bushings		
	d) Between HV bushings		
(M)	TANK BASE CHANNEL/ ROLLERS:		
	1) Size of channel (mm)		
	2) Whether channels welded across the length of the tank		
(N)	OIL:		

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	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)			
(O)	ENGRAVING:			
	1) Engraving of Sl. No. and name of firm.			
	a) On bottom of clamping channel of core-coil assembly.			
	b) On Top cover of tank			
(P)	i) MS Plate of size 125× 125 mm welded on width side of stiffner.			
	ii) Following details engraved (as per approved GTP):			
	a) Serial Number			
	b) Name of firm			
	c) Order No. and date			
	d) Rating			
	e) Date of dispatch			
(Q)	NAME PLATE DETAILS:			
	Whether Name Plate is as per approved drawing			
(R)	COLOUR OF TRANSFORMER			
	1) Tank body			
(S)	CHECKING OF TESTING FACILITIES:			
	(Calibration certificate also to be checked for its validity)			
	TESTS:			
	1) No Load Current			
	2) No Load Loss			
	3) % Impedance			
	4) Load losses			
	5) Insulation Resistance test			
	6) Vector group Test (phase relationship)			
	7) Ratio and Polarity test relationship			
	8) Transformer oil Test (Break Bown Voltage)			
	9) Magnetic Balance			
	10) Measurement of winding resistance (HV and LV both)			
	11) Induced over voltage withstand test (Double voltage and Double frequency)			
	12) Separate source power frequency withstand test at 28kV for HV and 3kV (One minute).			
	13) Air, pressure/oil leakage Test			
	14) Vacuum Test			
	15) Unbalanced current test			
	16) Temperature rise (Heat run) test.			
(T)	We have specifically checked the following and found the same as per G.T.P/ deviations observed as mentioned against each:			
	(i) Rustlessness of CRGO laminations used			
	ii) Core steps			
	iii) Core area			
	iv) Core weight			
	v)Core lamination thickness			

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vi) Winding cross sectional area			
a) LV			
b) HV			
vii) Weight of windings			
viii) Clearance between winding and wall of tank (mm)			
a) Length-wise			
b) Breadth-wise			
ix) Clearance between top yoke/ top most live part of tap changer to tank cover.			
x) Details of Neutral formation			
xi) Connections to Bushings:			
a) LV			
b) HV			
xii) Slope of tank top			
xiii) Position of mounting of bushings			

PURCHASER'S OFFICER

BIDDER'S REPRESENTATIVE

DATE OF INSPECTION

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ANNEXURE-II

PERFORMA FOR PRE-DELIVERY INSPECTION OF DISTRIBUTION TRANSFORMERS

1.	Name of the firm	
2.	Details of offer made	
	(i) Order No. and date	
	(ii) Rating	
	(iii) Quantity	
	(iv) Sl. No. of transformers	
3.	Date of stage inspection of the lot	
4.	Reference of stage inspection clearance	
5.	Quantity offered and inspected against the order prior to this lot	

ACCEPTANCE TESTS TO BE CARRIED OUT

S No.	PARTICULARS	OBSERVATIONS
1.	(a) Ratio Test	AB/an
		BC/bn
		CA/cn
	(b) Polarity Test	
2.	No load loss measurement	
		W1
		W2
		W3
	TOTAL	
	Multiplying factor	
	CT	
	Watt meter	
	Total × MF	
	NET LOSS	
3.	Load loss measurement	
		W1
		W2
		W3
	Total	
	Multiplying factors:-	
	CT	
	Watt meter	
	PT	
	Total × MF	
	Loss at ambient temperature (Watt)	
	Loss at 75 deg C (with calculation sheet) (Watt)	
4.	Winding Resistance :	
	H.V. (in Ohms)	

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	At ambient temperature of _____deg.C	A-B
		B-C
		C-A
	Resistance at 75 deg.C	A-B
		B-C
		C-A
	L.V. (in Ohms)	
	At ambient temperature of _____deg.C	a-b
		b-c
		c-a
	Per Phase resistance at 75 deg.C	a-b
		b-c
		c-a
5.	Insulation resistance (M ohm)	HV-LV
		HV-E
		LV-E
6.	Separate source Voltage withstand test voltage:	
	HV	28 kV for 60 secs.
	LV	3 kV for 60 secs.
7.	Induced over-voltage withstand test at double voltage and double frequency	100 Hz, 830 volts for 60 seconds.
8.	No load current at	
	90% volts	
	100%	
	112.5% volts	
9.	Unbalance current	
10.	Vector group test	Diagram and readings be shown in separate sheets
11.	Percentage Impedance at 75 deg.C (Please furnish calculation sheet)	
12.	Transformer oil test (Break down voltage)	
13.	Oil leakage test	
14.	Heat run test	To be carried out against the every offered lot
15.	Bushing clearance (mm)	HV
	a) Phase to Phase	LV
	b) Phase to earth	
16.	Comments on compliance by the firm on the modifications done as per stage inspection clearance letter issued.	
17.	Whether fittings of the order have been verified.	
18.	Whether UV protected seamless acrylic tube silica gel breather is fitted on the transformers offered.	

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19.	Whether engraving of Sl.no. and name of firm on core clamping channel, side wall and top cover of tank has been verified.	
20.	Whether MS Plate of size 125 × 125 mm welded on with side of stiffner.	
21.	Whether engraving of name of firm, S No., rating of transformer, Order No. and date and Date of Dispatch on MS Plate.	
22.	Copy of calibration certificates of metering equipment be enclosed.	

PURCHASER'S OFFICER

BIDDER'S REPRESENTATIVE

DATE OF INSPECTION

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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.	Laminations			
2.	Copper Conductor			
3.	Insulating winding wires			
4.	Oil			
5.	Press Boards			
6.	Kraft paper			
7.	MS Plates/Angles/Channels			
8.	Gaskets			
9.	Bushing HV/LV			
10.	Paints			

PURCHASER'S OFFICER

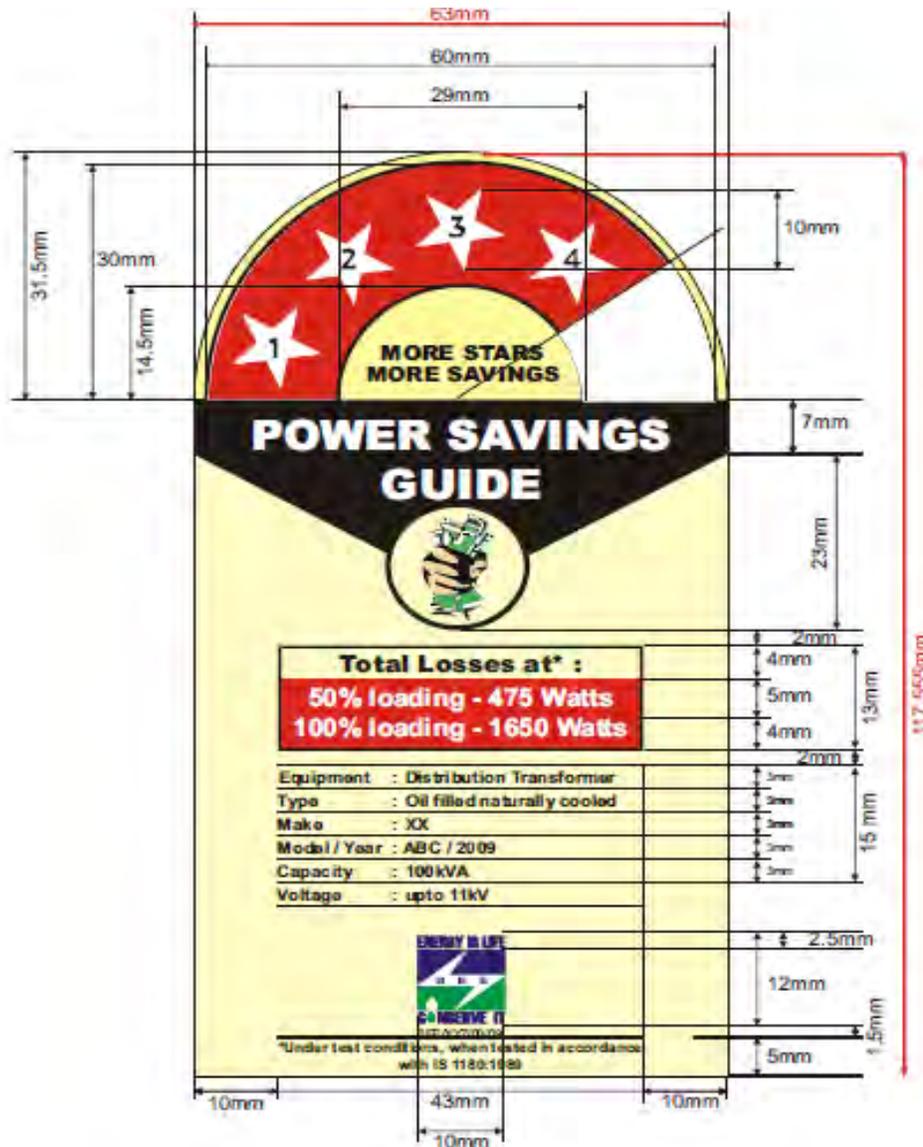
BIDDER'S REPRESENTATIVE

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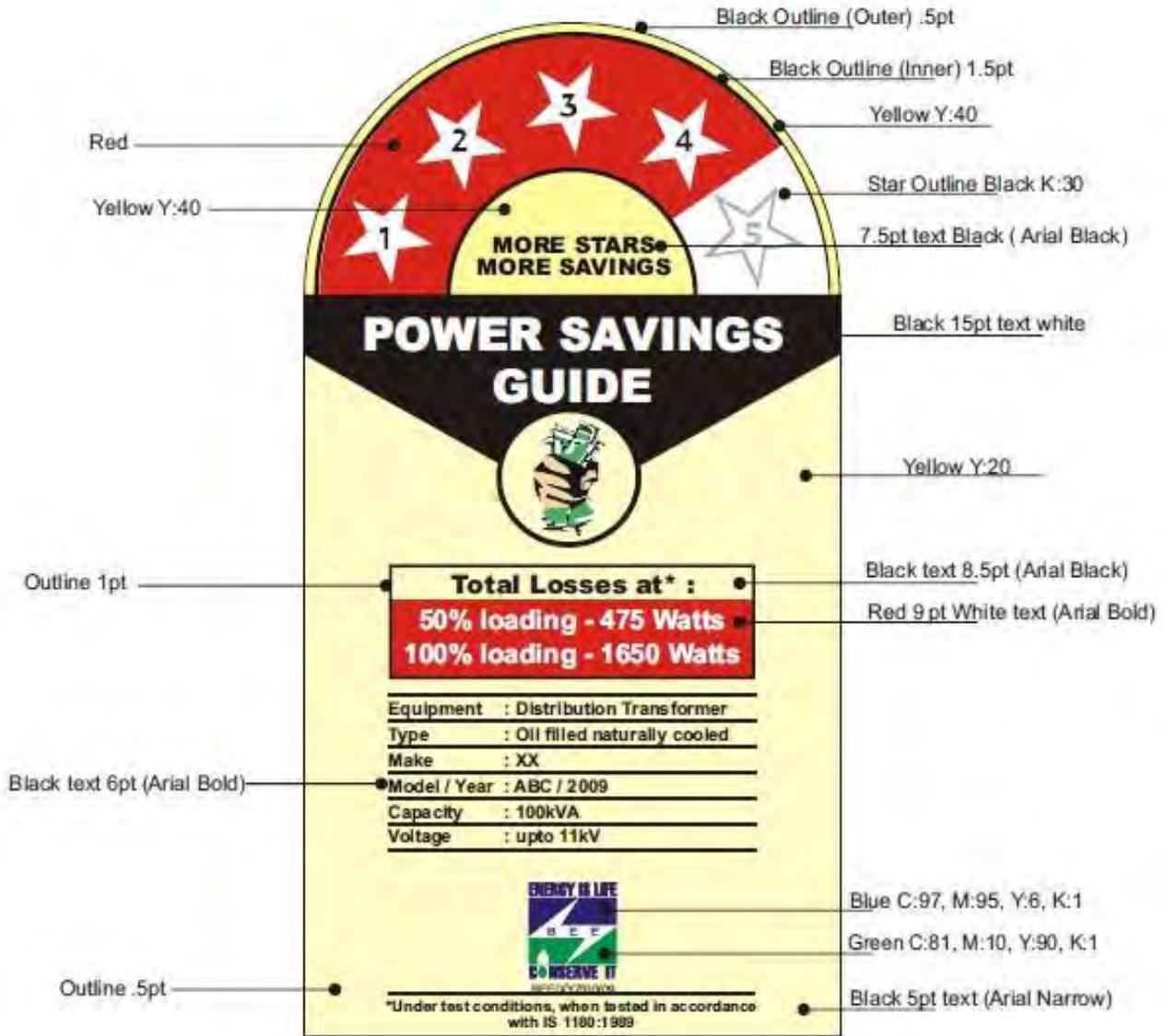
ANNEXURE-IV

1. The label shall be applied on the front base of the equipment near the name plate, so as to be prominently visible on the equipment.



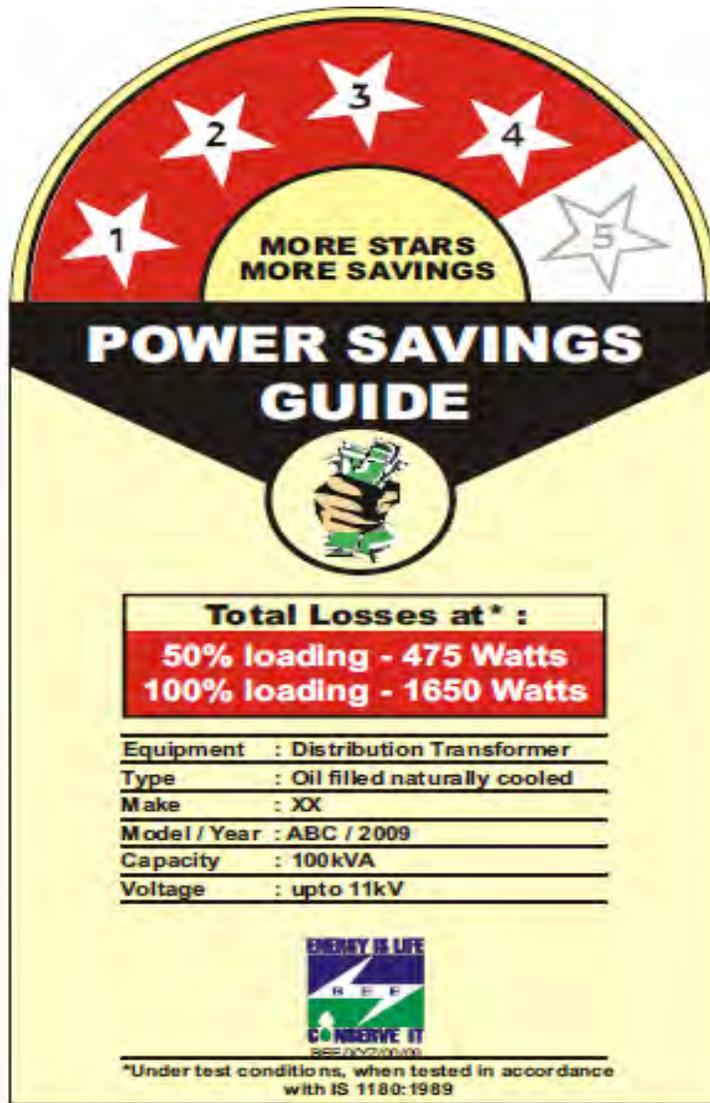
2. The following colour scheme for the label, namely :

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3. Detailed label specifications (size, colour scheme, font size, security features, if any, etc), content of the label (parameters displayed on the label) is provided below:

Rev No.	Prepared By & Date	Checked By & Date	Approved for Issue By & Date
R00	 Ketan Jadhav 01/08/24	 Ajay V. Potdar 01/08/24	 Ravindra M. Bhanage 01/08/24



**MORE STARS
MORE SAVINGS**

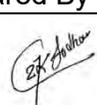
**POWER SAVINGS
GUIDE**

Total Losses at* :
50% loading - 475 Watts
100% loading - 1650 Watts

Equipment	: Distribution Transformer
Type	: Oil filled naturally cooled
Make	: XX
Model / Year	: ABC / 2009
Capacity	: 100kVA
Voltage	: upto 11kV

ENERGY IS LIFE
CONSERVE IT
SEE 00270000

*Under test conditions, when tested in accordance with IS 1180:1989

Rev No.	Prepared By & Date	Checked By & Date	Approved for Issue By & Date
R00	 Ketan Jadhav 01/08/24	 Ajay V. Potdar 01/08/24	Ravindra M. Bhanage 01/08/24

AGREED TERMS & CONDITIONS (ATC)- Indigenous Supply

Bidder's Name: M/s. _____

RFQ ref. No. CC26VJS001

Enquiry Description: OLA of 2 years for Supply of Oil DTs for Mumbai Distribution

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	<u>TECHNICAL</u>	
1	Acceptance of technical specifications / scope of work including General/Technical notes as per Tender specification 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	<u>COMMERCIAL</u>	
3	Bid Validity Confirm Bid Validity 180 days from date of bid submission.	
4	Firm price: Quoted prices shall be subject to PV clause mentioned in ITB	
5	Delivery Terms Confirm delivery terms FOR basis	
6	Packing & Forwarding Confirm that Packing & Forwarding charges including Special Packaging Requirement (if applicable) are included in base price	
7	Freight Charges Confirm that Freight charges & Transit insurance are included in base price	
8	Taxes and duties: GST: __% HSN/ SAC Code: Any other tax as applicable:	
9	LD clause: Confirm that Bidder agrees to the LD clause mentioned in GTC	
10	Completion/Delivery Period: Mention your delivery timelines from the date of order	
11	Payment Terms Acceptance: Confirm acceptance as per GTC – Supply	
12	Warranty / Latent Defect Liability Period: Confirm acceptance as per GTC – Supply	
13	Contract Performance Bank Guarantee: Confirm acceptance to Submission of Unconditional Bank Guarantee as per GCC Supply.	
14	Testing and Inspection charges (if applicable): Confirm the quoted are Inclusive of all testing and inspection charges as per Tender specification	

S. No.	Description	BIDDER'S RESPONSE
15	<p>Compliance to other terms & conditions</p> <p>Acceptance of all other terms & conditions as forming the Part of the RFQ/ Tender document and communicated vide subsequent addendum(s) if any:</p> <p>In case of deviation, confirm that the same has been furnished separately.</p>	

*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:

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 Contract.

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

Rev. date: 25 July 2017

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 its 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 statutes: (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? 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? Please share the details, Policies etc.		
3	Does your company have a formal process to address data security or privacy issues? 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

CORPORATE SUSTAINABILITY POLICY

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

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

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



(Praveer Sinha)
CEO & Managing Director

Date: 15th June, 2018



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.

Tata Code of Conduct- (TCoC): <https://www.tatapower.com/pdf/aboutus/Tata-Code-of-Conduct.pdf>

Whistle Blower Policy: <https://www.tatapower.com/pdf/aboutus/whistle-blower-policy-and-vigil-mechanism.pdf>

Anti-Bribery & Anti-Corruption Policy: <https://www.tatapower.com/pdf/aboutus/abac-policy.pdf>

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:

Toll-free Number	1800 267 4065
Email	tatapower@tip-offs.in
Website & Chatbot	www.tatapower.tip-offs.in
Postal address	Attn to: Mr. Puneet Arora, Deloitte Touch Tohmtsu India LLP, 6 floor, AIPL Business, Sector 62, Gurugram, Haryana 122102