BSES
RAJDHANI POWER LIMITED

# Volume – I

## Tender Notification for

# RATE CONTRACT FOR THE PROCUREMENT OF VARIOUS RATINGS OF OIL TYPE DISTRIBUTION TRANSFORMER IN BRPL

## CMC/BR/25-26/FK/PR/RJ/1265

## Due Date for Submission of Bids: 23.04.2025

**BSES RAJDHANI POWER LTD (BRPL)**
**BSES Bhawan, Nehru Place, New Delhi-110019**
**Corporate Identification Number: U74899DL2001PLC111527**
**Telephone Number: +91 11 3009 9999**
**Fax Number: +91 11 2641 9833**
**Website: www.bsesdelhi.com**

BSES
RAJDHANI POWER LIMITED

# Section – I

# REQUEST FOR QUOTATION

## Tender Notification: CMC/BR/25-26/FK/PR/RJ/1265

## Rate Contract for the Supply of Various Ratings of Oil Type Distribution Transformer in BRPL

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INDEX

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## SECTION – I: REQUEST FOR QUOTATION

### 1.0 Event Information

**1.01** BRPL invites bids through online portal for supply of various ratings of Oil Type Distribution Transformer from the manufacturers. The bidder must qualify the technical requirements as specified in clause 2.0 stated below. The tender shall be duly super scribed as — **"BID FOR RATE CONTRACT FOR THE SUPPLY OF VARIOUS RATINGS OF OIL TYPE DISTRIBUTION TRANSFORMER FOR VARIOUS SITES OF BRPL, TENDER NOTICE CMC/BR/25-26/FK/PR/RJ/1265 DUE FOR SUBMISSION ON DT. 23.04.2025"**.

| Sl. No. | Item Description | Specification | Requirement | Estimated Cost |
|---|---|---|---|---|
| | | | Total Qty. | |
| **BRPL, DELHI** | | | | |
| 1 | Various Ratings of Oil Type Distribution Transformer for Various Sites in BRPL | SECTION V | 258 Nos. | 71.81 Cr |

**Note: Quantity may vary to any extent of +/- 30% of above mentioned total quantity.**

**1.02** The schedule of specifications with detail terms & conditions can be obtained from address given below against demand draft/Pay Order of **Rs.1180/- with GST**-, drawn in favour of **BSES RAJDHANI POWER LTD**, payable at New Delhi. The sale of tender documents will be issued from **03.04.2025** onwards on all working days up to **16.04.2025**. The tender documents can also be downloaded from the website **www.bsesdelhi.com** or **https://srmprdportal.bsesdelhi.com/irj/portal**

In case tender papers are downloaded from the above website, the bidder has to submit the demand draft covering the cost of bid documents and EMD as mentioned in tender document in a separate sealed envelope with suitable superscription - **Tender Fee & EMD** and **Tender Notice Ref: CMC/BR/25-26/FK/PR/RJ/1265, Due date of submission, Tender opening date**. This envelope should be deliver to the following address (scanned copy of Tender Fee & EMD to be uploaded on e –procurement portal):

**HEAD OF THE DEPARTMENT, 1st FLOOR, 'C' BLOCK,**
**CONTRACTS & MATERIALS DEPARTMENT, BSES RAJDHANI POWER LTD,**
**BSES BHAWAN,**
**NEHRU PLACE, NEW DELHI-110019**

**1.03** Offers will be received up to **1500 Hrs. on dt. 23.04.2025** as indicated earlier and will be opened at the address mentioned above dt. **23.04.2025 at 1530 Hrs.** in the presence of authorized representatives of the bidders. The schedule of specifications with detail terms & conditions are enclosed. It is the sole responsibility of the bidder to ensure that the bid documents reach this office on or before the due date.

**1.04** BRPL reserves the right to accept/ reject any or all Tenders without assigning any reason thereof and alter the quantity of materials mentioned in the Tender documents at the time of placing purchase orders. Tender will be summarily rejected if:

i) Earnest Money Deposit (EMD) @ 1% (One percent) of the Tender value i.e. **Rs. 71,81,000/-** is not deposited in shape of Bank Draft in favour of BSES RAJDHANI POWER LTD, payable at New Delhi or Bank Guarantee executed on favour of BSES RAJDHANI POWER LTD.

ii) The offer does not contain "FOR, NEW DELHI price indicating break-up towards all taxes & duties".

iii) Complete Technical details are not enclosed.

iv) Tender is received after due time due to any reason.

**1.05** BRPL reserves the right to reject any or all bids or cancel/ withdraw the invitation for bids without assigning any reason whatsoever and in such case no bidder/ intending bidder shall have any claim arising out of such action time of placing purchase orders.

**2.0 Qualification Criteria**:-

The prospective bidder must qualify all of the following requirements to be eligible to participate in the bidding. Bidders who meet following requirements will be considered as successful bidder and management has a right to disqualify those bidders who do not meet these requirements.

*1)* The bidder should have own manufacturing facility in India for Distribution transformer of similar rating or higher since last 3 years. *manufacturing and factory incorporation certificate/undertaking are submitted by bidder. The details of manufacturing units, locations and works from where supply against this tender shall be proposed to be furnished.*

*2)* The Bidder should have supplied at least 100 Nos. of transformers of 990/1000KVA rating or higher in last 5 years from the date of bid opening to any utilities/SEB's/PSU's/reputed company (wherein the end user shall be Utility/SEB's/PSU's) *i. Summary list of executed Purchase orders ii. Purchase order copies iii. Material delivery clearance certificate copy or delivery completion certificates or invoice copies*

3) Performance certificate for minimum 2 year satisfactory performance for 990/1000 kVA or higher rating supplied in last 7 years from the date of bid opening from at least two utilities/ SEB/ PSUs / reputed (company wherein the end user shall be Utility/SEB's/PSU's). In case of bidder has a previous association with BRPL/BYPL for similar product and service, the performance feedback for that bidder by BRPL/BYPL shall only be considered irrespective of performance certificate issued by any third organization. *Performance Certificate*

4) The bidder should have servicing , repairing, testing & refurbishment facility in INDIA with necessary spares and testing equipments for providing prompt after sales service for DT. *Relevant Details/certificates/Undertaking. Details of the set-up available shall be brought out in the offer. The bidder shall submit undertaking along with the bid confirming the infrastructure details submitted.*

5) The bidder should have manufacturing capacity of minimum 20 nos. DT's per month- *Installed Capacity Certificate*

6) The bidder must possess valid ISO 9001:2015 certification and BIS License - *Valid copy of Certification*

*7)* Bidder should have Average Annual Sales Turnover of Rs 70 Crores or more in last three (3) Financial Years (i.e., FY 2020-21, 2021-22 & 2022-23).- *Balance Sheet /CA Certificate to be submit*

*8)* The Bidder shall submit an undertaking "No Litigation" is pending with the BRPL or its Group/Associates Companies as on date of bid opening.- *Undertaking*

*9)* An undertaking (self-certificate) that the bidder has not been blacklisted/debarred by any central/state government institution including electricity utilities as on date of bid opening. – *Undertaking*

*10)* The bidder must have valid PAN No., GST Registration Number, in addition to other statutory compliances. The bidder must submit the copy of registrations and submit an undertaking that the bidder shall comply all the statuary compliances as per the laws/rules etc. before the start of the work- *Relevant Statutory Documents Copy/Undertaking*

## 3.0 Bidding and Award Process

Bidders are requested to submit their questions regarding the RFQ or the bidding process after review of this RFQ. BRPL response to the questions raised by various bidders will be distributed to all participating bidders through website.

### a. Time schedule of the bidding process

The bidders on this RFQ package should complete the following within the dates specified as under:

| S.No. | Steps | Activity description | Due date |
|---|---|---|---|
| 1 | Technical Queries | All Queries related to RFQ | On or before 16.04.2025 1500 Hrs. |

| | | | |
|---|---|---|---|
| 2 | Technical Offer | Documentary evidence in support of qualifying criteria. Technical Literature/ GTP/ Drawings/ Type test report, if any, etc., Testing facilities, any other relevant document, acceptance to commercial terms & conditions viz. delivery Schedule/ Period, Payment terms, PBG etc. Quality assurance plan, Deviation from the specification, list of plant & machinery and testing equipments Un priced items. | 23.04.2025, 1500 Hrs |
| 3 | Commercial Offer | Prices for Distribution Transformer and Break up regarding basic price and taxes. Delivery commitment | 23.04.2025, 1500 Hrs |
| 4 | Opening of technical bid | As per RFQ | 23.04.2025, 1530 Hrs |

**b. Bid submission through E-Procurement Portal**

BSES will carry out E-Procurement through its e-procurement portal (https://srmprdportal.bsesdelhi.com/irj/portal). Interested Non-registered bidders are requested to obtain the portal user name and password (if not available) for bid submission. For participating in e-Tenders of BRPL, please write a mail to : Mr. Satyam Singh, E-mail: satyam.singh@relianceada.com, with your details as per below:

a) Existing Vendor Code with BRPL or its Group/Associates Companies (if available):
b) Trade Name: …….
c) Address of Principal Place of Business: …….
d) Contact Person's Name: …….
e) Contact Person's Designation: …….
f) Contact Person's Mobile No.: …….
g) Contact Person's email ID: …….
h) Also, attach a valid copy of Power of Attorney in favour of mentioned Contact Person for being authorized to receive user ID and password on behalf of their organization.

The login ID details shall be sent through email to the email ID mentioned by you for the same.

Bids shall be submitted in 2 (Two) parts on the assigned folder of the e-procurement site. Please refer to the user manual available at https://srmprdportal.bsesdelhi.com:50001/irj/portal

This is a two part bid process. Bidders are to upload the bids (a) Technical Bid (b) Price Bid on website.

- **The Part-I (Technical Bid) -** Technical Bid should not contain any cost information whatsoever. In case of Bids where the qualification requirements, technical suitability and other requirements are found to be inadequate, Part-II "Financial Bid" will not be opened.

- **The Part-II (Financial Bid) -** Qualified bidders will be intimated after technical evaluation of all the bids is completed. The date and time of same shall be intimated in due course to the qualified bidders. Notwithstanding anything stated above, the Purchaser reserves the right to assess bidder's capability to perform the contract, should the circumstances warrant such assessment in the overall interest of the purchaser. In this regard the decision of the purchaser is final.

  **Bids have to be mandatorily submitted only through the e-procurement portal of BSES Delhi. Bids submitted through any other form/ route shall not be admissible. However, documents that necessarily have to be submitted in originals like EMD or Tender Fee (in the form of BG as applicable) and any other documents mentioned in the tender documents have to be submitted at the BRPL office before the due date and time of submission. Please mention the NIT No ……. on sealed envelope of EMD and DD and submit the documents on following address (scanned copy of EMD and Tender Fee to be uploaded on e-procurement portal):**

**HEAD OF THE DEPARTMENT, 1st FLOOR, 'C' BLOCK,**
**CONTRACTS & MATERIALS DEPARTMENT, BSES RAJDHANI POWER LTD,**
**BSES BHAWAN,**
**NEHRU PLACE, NEW DELHI-110019.**

## 4.0 REVERSE AUCTION CLAUSE

Purchaser reserves the right to use the reverse auction tool through SAP – SRM as an integral part of the entire tendering process. All techno commercially qualified bidders shall participate in the reverse auction. Notwithstanding anything stated above, the Purchaser reserves the right to assess the bidder's capability to perform the contract, should the circumstances warrant such assessment in the overall interest of the purchaser. In this regard the decision of the purchaser is final. Bidder is to submit their acceptance as per the format attached ANNEXURE-VI.

## 5.0 Award Decision

Purchaser intends to award the business on a lowest bid basis, so suppliers are encouraged to bid competitively. The decision to place purchase order / letter of acceptance solely depends on purchaser on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that Purchaser may deem relevant.

The purchaser 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 any reason.

BSES reserves the right to split the tender quantity amongst techno commercially qualified bidders on account of delivery requirement in tender, quantity under procurement etc.

Splitting of tender quantity amongst more than one bidder shall be governed by below mentioned guidelines:

- If the quantity is to be split among 2 bidders, it will be done in the ratio of 70:30 on L1 price.
- If the quantity is to be split among 3 bidders, it will be done in the ratio of 60:25:15 on L1 price.
- In case quantity needs to be distributed and order splitting is required, distribution of quantity shall be maximum among three (3) bidders.

In the event of your bid being selected by purchaser (and / or its affiliates) and your subsequent DEFAULT on your bid; you will be required to pay purchaser (and / or its affiliates) an amount equal to the difference in your bid and the next lowest bid on the quantity declared in RFQ.

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

**Quantity Variation**: The purchaser reserves the rights to vary the quantity by **+/- 30%** of the tender quantity.

**Rate Contract:** The rate contract shall have a validity period of 12 months from the date of LOI / PO issued to the responsive, techno- commercially acceptable and evaluated to be lowest bidder.

**Repeat Order**: BRPL reserves the right to place repeat order at the same rates & terms and conditions as per this tender against additional requirement subject to mutual agreement between BRPL & supplier.

## 6.0 Market Integrity:

We have a fair and competitive marketplace. The rules for bidders are outlined in the Terms & Conditions. Bidders must agree to these rules prior to participating. In addition to other remedies available, we 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 Terms & Condition. Bidders who violate the marketplace rules or engage in behavior that disrupts the fair execution of the marketplace restricts a bidder to 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 the terms of the published in Request For Quotation.

## 7.0 Supplier Confidentiality

All information contained in this RFQ is confidential and may not be disclosed, published or advertised in any manner without written authorization from BRPL. This includes all bidding information submitted.

All RFQ documents remain the property of BRPL and all suppliers are required to return these documents to BRPL upon request.

Suppliers who do not honor these confidentiality provisions will be excluded from participating in future bidding events.

## 7.0 Contact Information

All communication as regards this RFQ shall be made (i) in English, (ii) in writing and (iii) sent by mail, facsimile to:

| | Technical | Commercial |
|---|---|---|
| Contact Name | Mr. Amit Tomar<br>Copy to Mr. Gopal Nariya | Ms Rachna Jain<br>Copy to Mr. Pankaj Goyal & Mr. Satyam Singh |
| Address | BSES RAJDHANI POWER LTD, 2nd Floor, B Block, Nehru Place, New Delhi – 110019 | C&M Deptt. 1st floor, D- Block, BSES Rajhdhani Power Limited, BSES Bhawan, Nehru Place, New Delhi -110019 |
| Email-ID | amit.as.tomar@reliancegroupindia.com<br>gopal.nariya@reliancegroupindia.com | rachna.jain@reliancegroupindia.com<br>pankaj.goyal@reliancegroupindia.com<br>satyam.singh@reliancegroupindia.com |

BSES
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# SECTION – II

# INSTRUCTION TO BIDDERS (ITB)

# RATE CONTRACT FOR THE SUPPLY OF VARIOUS RATINGS OF OIL TYPE DISTRIBUTION TRANSFORMER IN BRPL

## CMC/BR/25-26/FK/PR/RJ/1265

## A. GENERAL

**1.00** BSES Rajdhani Power Ltd, hereinafter referred to as the Purchaser are desirous of implementing the various Systems Improvement/Repair & Maintenance works at their respective licensed area in Delhi. The Purchaser has now floated this tender for procurement of Distribution Transformer as notified earlier in this bid document.

### 2.00 SCOPE OF WORK

The scope shall include Design, Manufacture, Testing at works conforming to the Technical Specifications enclosed along with Packing, Forwarding, Freight and Unloading and proper stacking at Purchaser's stores.

### 3.00 DISCLAIMER

3.01 This Document includes statements, which reflect various assumptions, which may or may not be correct. Each Bidder/ Bidding Consortium should conduct its own estimation and analysis and should check the accuracy, reliability and completeness of the information in this Document and obtain independent advice from appropriate sources in their own interest.

3.02 Neither Purchaser nor its employees will have any liability whatsoever to any Bidder or any other person under the law or contract, the principles of restitution or unjust enrichment or otherwise for any loss, expense or damage whatsoever which may arise from or be incurred or suffered in connection with anything contained in this Document, any matter deemed to form part of this Document, provision of Services and any other information supplied by or on behalf of Purchaser or its employees, or otherwise a rising in any way from the selection process for the Supply.

3.03 Though adequate care has been taken while issuing the Bid document, the Bidder should satisfy itself that Documents are complete in all respects. Intimation of any discrepancy shall be given to this office immediately.

3.04 This Document and the information contained herein are Strictly Confidential and are for the use of only the person(s) to whom it is issued. It may not be copied or distributed by the recipient to third parties (other than in confidence to the recipient's professional advisors).

### 4.00 COST OF BIDDING

The Bidder shall bear all cost associated with the preparation and submission of its Bid and Purchaser will in no case be responsible or liable for those costs.

## B BIDDING DOCUMENT

### 5.00 BIDDING DOCUMENTS

5.01 The Scope of Work, Bidding Procedures and Contract Terms are described in the Bidding Documents. In addition to the covering letter accompanying Bidding Documents, the Bidding Documents include:

**Volume –I**

| | | |
|---|---|---|
| a) | Request for Quotation (RFQ) | - Section – I |
| b) | Instructions to Bidders (ITB) | - Section – II |
| c) | General Conditions of Contract | - Section - III |
| d) | Quantity and delivery requirement | - Section –IV |
| e) | Technical Specifications (TS) | - Section –V |

**Volume – II**

| | | |
|---|---|---|
| a) | Bid Form | - Annexure – I |
| b) | Bid Format | - Annexure – II |
| c) | Price Schedule | - Annexure – III |
| d) | Commercial Terms & Conditions | - Annexure - IV |
| e) | No Deviation Sheet | - Annexure - V |
| f) | Qualification Criterion | - Annexure - VI |

5.02 The Bidder is expected to examine the Bidding Documents, including all Instructions, Forms, Terms and specifications. Failure to furnish all information required by the Bidding documents or submission of a Bid not substantially responsive to the Bidding Documents in every respect will may result in the rejection of the Bid.

## 6.00 AMENDMENT OF BIDDING DOCUMENTS

6.01 At any time prior to the deadline for submission of Bids, the Purchaser may for any reasons, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the Bidding Documents by Amendment.

6.02 The Amendment shall be part of the Bidding Documents, pursuant to Clause 5.01, and it will be notified in writing by Fax/e-mail to all the Bidders who have received the Bidding Documents and confirmed their participation to Bid, and will be binding on them.

6.03 In order to afford prospective Bidders reasonable time in which to take the Amendment into account in preparing their Bids, the Purchaser may, at its discretion, extend the deadline for the submission of Bids.

## C PREPARATION OF BIDS

## 7.00 LANGUAGE OF BID

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

## 8.00 DOCUMENTS COMPRISING THE BID

The Bid prepared and submitted by the Bidder shall comprise the following components:

a) Bid Form ,Price & other Schedules (STRICTLY AS PER FORMAT) and Technical Data Sheets completed in accordance with Clause 9.0, 10.0, 11.0 and Technical Specification;

b) All the Bids must be accompanied with the required EMD as mentioned in the Section-I against each tender.

c) Power of Attorney or Authorization letter indicating that the person(s) signing the Bid have the authority to sign the Bid and thus that the Bid is binding upon the Bidder during the full period of its validity, in accordance with clause 12.0.

## 9.00 BID FORM

9.01 The Bidder shall complete an "Original" and another one "Copy" of the Bid Form and the appropriate Price & Other Schedules and Technical Data Sheets.

9.02 **EMD**

Pursuant to Clause 8.0(b) above, the bidder shall furnish, as part of its bid, a EMD amounting to 1% of the total bid value (FOR Destination) i.e. Rs. **71,81,000/-**. The EMD is required to protect the Purchaser against the risk of Bidder's conduct which would warrant the security's forfeiture.

The EMD shall be denominated in the currency of the bid, and shall be in the following form:

a) A bank guarantee issued by any scheduled bank strictly as per the form at enclosed and shall be valid for a period of thirty (30) days beyond the validity of the bid.

b) Bank Draft in favour of BSES RAJDHANI POWER LTD, payable at New Delhi.

Unsuccessful bidders' EMD will be discharged or returned as promptly as possible as but not later than thirty (30) days after the expiration of the period of bid validity.

The successful bidder's EMD will be discharged upon furnishing the performance security. The EMD may be forfeited:

a) If the Bidder:
i) Withdraws its bid during the period of bid validity specified by the Bidder in the Bid Form; or

b) in the case of a successful Bidder, if the Bidder fails:

i) to sign the Contract, or

ii) to furnish the required performance security.

## 10.00 BID PRICES

10.01 Bidders shall quote for the entire Scope of Supply with a break-up of prices for individual items. The total Bid Price shall also cover all the Supplier's obligations mentioned in or reasonably to be inferred from the Bidding Documents in respect of Design, Supply, Transportation to site, all in accordance with

the requirement of Bidding Documents the Bidder shall complete the appropriate Price Schedules included herein, stating the Unit Price for each item & total Price.

10.02 The prices offered shall be inclusive of all costs as well as Duties, Taxes and Levies paid or payable during execution of the supply work, breakup of price constituents, should be there.

10.03 Prices quoted by the Bidder shall be **"Variable"**.

10.04 Price Variation Formula

$$P=P_0/100 * (7+41*C/C_0+23*ES/ES_0+10*IS/IS_0+5*IM/IM_0+8*TO/TO_0+6*W/W_0)$$

P = Ex-works Price payable as adjusted in accordance with above formula

$P_0$ = Ex-works Price as per RC/PO.

C = Price of CC copper rods. This price is as applicable for the month, ONE month prior to the date of delivery.

ES = Price of CRGO Electrical Steel Lamination. This price is as applicable for the month, ONE month prior to the date of delivery.

IS = Price of HR Coil of 3.15 mm thickness. This price is as applicable for the month, ONE month prior to the date of delivery.

IM = Price of Insulating Materials. This price is as applicable for the month, ONE month prior to the date of delivery.

TO = Price of Transformer Oil. This price is as applicable for the month, ONE month prior to the date of delivery.

W = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base: 2016 = 100). This index number is as applicable for the month, THREE months prior to the date of delivery.

$C_0$ = Price of CC copper rods. This price is as applicable for the month, ONE month prior to the due date of tender.

$ES_0$ = Price of CRGO Electrical Steel Lamination. This price is as applicable for the month, ONE month prior to the due date of tender.

$IS_0$ = Price of HR Coil of 3.15 mm thickness. This price is as applicable for the month, ONE month prior to the due date of tender.

$IM_0$= Price of Insulating Materials. This price is as applicable for the month, ONE month prior to the due date of tender.

$TO_0$ = Price of Transformer Oil. This price is as applicable for the month, ONE month prior to the due date of tender.

$W_0$ = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base: 2016 = 100). This index number is as applicable for the month, THREE months prior to the due date of tender.

The above prices and indices are as published by IEEMA prevailing as on the first working day of the calendar month, i.e. one month prior to the date of tender submission e.g. if tender is submitted in May 2022, the applicable prices should be those prevailing as on 1st April, 2022.

If the date of delivery in terms of clause given below falls in November 2022, the applicable prices of raw material should be as published by IEEMA prevailing as on 1st October, 2022.

Note:

a) All prices of raw materials are exclusive of GST amount and exclusive of any other Central, State or Local Taxes etc.
b) Due Date of Tender is the original due date of tender submission. If due date of tender (bid submission) is extended due to any reason, the base date (original due date) will remain unchanged for the calculation of PV clause.
c) The date of delivery for PV calculation shall be the date on which the equipment/material is notified as being ready for inspection/dispatch or the contracted delivery date whichever is earlier whenever supplies are affected within contractual delivery period. In case the supplies are effected after the original contractual delivery period, the date of delivery for P.V. purpose would be the one out of original or extended date on which price variation is lower.

Bidder shall submit detailed calculation of revised rate and amount as per the Price Variation Formula along with relevant IEEMA circulars. After approval/clearance from Buyer of revised rates, Invoicing shall be done by the supplier

## 11.00 BID CURRENCIES

Prices shall be quoted in **Indian Rupees (INR) only**.

## 12.00 PERIOD OF VALIDITY OF BIDS

12.01 Bids shall remain valid for **120 days** post bid date.

12.02 Notwithstanding Clause12.01 above, the Purchaser may solicit the Bidder‘s consent to an extension of the Period of Bid Validity. The request and the responses thereto shall be made in writing by Fax/e-mail.

## 13.00 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 of Clause 22.03 & 22.04 regarding the rejection of Bids, which are not substantially responsive to the requirements of the Bidding Documents.

## 14.00 FORMAT AND SIGNING OF BID

14.01 The original Bid Form and accompanying documents (as specified in Clause 9.0), clearly marked "Original Bid", plus one copy must be received by the Purchaser at the date, time and place specified pursuant to Clauses15.0 and16.0. In the event of any discrepancy between the original and the copies, the original shall govern.

14.02 The original and copy of the Bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to sign on behalf of the Bidder. Such authorization shall be indicated by written Power-of-Attorney accompanying the Bid.

14.03 The Bid shall contain no interlineations, erasures or overwriting except as necessary to correct errors made by the Bidder, in which case such corrections shall be initialed by the person or persons signing the Bid.

## D SUBMISSION OF BIDS

### 15.0 SEALING AND MARKING OF BIDS

15.01 Bid submission: All the Bid Documents shall be uploaded on website before the closing time for submission of the bid.

15.02 The EMD and tender fee shall be enclosed in a sealed envelope and the said envelope shall be superscribed with **— Tender Fee & EMD** and **"Tender Notice no., Due date of submission, Tender opening date"**

15.03 Bids submitted by Telex/ Telegram/ Fax/ in person will not be accepted. No request from any Bidder to the Purchaser to collect the proposals from Airlines/Cargo Agents etc. shall be entertained by the Purchaser.

### 16.0 DEADLINE FOR SUBMISSION OF BIDS

16.01 The Bid must be received by the Purchaser not later than **1500 HRS on 23.04.2025**

16.02 The Purchaser may, at its discretion, extend the deadline for the submission of Bids by amending the Bidding Documents in accordance with Clause9.0, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

### 17.0 ONE BID PER BIDDER

Each Bidder shall submit only one Bid. A Bidder who submits or participates in more than one Bid will cause all those Bids to be rejected.

### 18.00 LATE BIDS

Any Bid received by the Purchaser after the deadline for submission of Bids prescribed by the Purchaser, pursuant to Clause 16.0, will be declared "Late" and rejected and returned unopened to the Bidder.

### 19.00 MODIFICATIONS AND WITHDRAWAL OF BIDS

19.01 The Bidder is not allowed to modify or withdraw its Bid after the Bid's submission.

## E. EVALUATION OF BID

### 20.00 PROCESS TO BE CONFIDENTIAL

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

## 21.00 CLARIFICATION OF BIDS

To assist in the examination, evaluation and comparison of Bids, the Purchaser may, at its discretion, ask the bidder for a clarification of its Bid. 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.

## 22.00 PRELIMINARY EXAMINATION OF BIDS / RESPONSIVENESS

22.01 Purchaser 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.

22.02 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.

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

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

## 23.0 EVALUATION AND COMPARISON OF BIDS

23.01 The evaluation of Bids shall be done based on the delivered cost competitiveness basis.

23.02 The evaluation of the Bids shall be a stage-wise procedure. The following stages are identified for evaluation purposes: In the first stage, the Bids would be subjected to a responsiveness check. The Technical Proposals and the Conditional ties of the Bidders would be evaluated. Subsequently, the Financial Proposals along with supplementary Financial Proposals, if any, of Bidders with Techno-commercially Acceptable Bids shall be considered for final evaluation.

23.03 The Purchaser's evaluation of a Bid will take into account, in addition to the Bid price, the following factors, in the manner and to the extent indicated in this Clause:

(a) Supply Schedule
(b) Deviations from Bidding Documents

Bidders shall base their Bid price on the terms and conditions specified in the Bidding Documents. The cost of all quantifiable deviations and omissions from the specification, terms and conditions specified in Bidding Documents shall be evaluated. The Purchaser will make its own assessment of the cost of any deviation for the purpose of ensuring fair comparison of Bids.

23.04 Any adjustment in price, which results from the above procedure, shall be added for the purposes of comparative evaluation only to arrive at an "Evaluated Bid Price". Bid Prices quoted by Bidders shall remain unaltered.

## F. AWARD OF CONTRACT

### 24.0 CONTACTING THE PURCHASER

24.01 From the time of Bid submission to the time of contract award, if any Bidder wishes to contact the Purchaser on any matter related to the Bid, it should do so in writing.

24.02 Any effort by a Bidder to influence the Purchaser and/or in the Purchaser‘s decisions in respect of Bid evaluation, Bid comparison or Contract Award, will result in the rejection of the Bidder‘s Bid.

### 25.0 THE PURCHASER ’S RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS

The Purchaser reserves the right to accept or reject any Bid and to annul the Bidding process and reject all Bids at anytime prior toward of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Purchaser‘s action.

### 26.0 AWARD OF CONTRACT

The Purchaser will award the Contract to the successful Bidder whose Bid has been Determined to be the lowest-evaluated responsive Bid, provided further that the Bidder has been determined to be qualified to satisfactorily perform the Contract. Purchaser reserves the right to award order other bidders in the tender, provided it is required for progress of project & provided he agrees to come to the lowest rate.

### 27.0 THE PURCHASER’S RIGHT TO VARY QUANTITIES

The Purchaser reserves the right to vary the quantity i.e. increase or decrease the numbers/quantities without any change in terms and conditions during the execution of the Order.

### 28.0 LETTER OF INTENT/ NOTIFICATION OF AWARD

The letter of intent/ Notification of Award shall be issued to the successful Bidder whose bids have been considered responsive, techno-commercially acceptable and evaluated to be the lowest (L1). The successful Bidder shall be required to furnish a letter of acceptance within 7 days of issue of the letter of intent /Notification of Award by Purchaser.

## 29.0 PERFORMANCE BANK GUARANTEE

Bidder shall initially submit the PBG within 28 days of placement of RC for 1% of RC Value (including GST) valid till RC validity period plus three month claim period. If there is extension in RC validity date, the BG shall be extended accordingly .

Upon submission of the performance security, the EMD shall be released.

Thereafter bidder shall submit PBG on Purchase Order (PO) basis for 10% of the PO value (including GST).The Performance Bond shall be valid for a period of twenty four months (24) from the date of the commissioning or thirty months (30) from the date of receipt of material (last consignment of PO) at site/ stores whichever is earlier plus 3 months towards claim period.

## 30.00 CORRUPT OR FRADULENT PRACTICES

30.01 The Purchaser requires that the Bidders observe the highest standard of ethics during the procurement and execution of the Project. In pursuance of this policy, the Purchaser:

(a) Defines, for the purposes of this provision, the terms set forth below as follows:

i) "Corrupt practice" means behavior on the part of officials in the public or private sectors by which they improperly and unlawfully enrich themselves and/or those close to them, or induce others to do so, by misusing the position in which they are placed, and it includes the offering, giving, receiving, or soliciting of anything of value to influence the action of any such official in the procurement process or in contract execution; and

ii) "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Purchaser, and includes collusive practice among Bidders (prior to or after Bid submission) designed to establish Bid prices at artificial non-competitive levels and to deprive the Purchaser of the benefits of free and open competition.

(b) Will reject a proposal forward if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question ;

(c) Will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a contract.

30.02 Furthermore, Bidders shall be aware of the provision stated in the General Conditions of Contract.

BSES
RAJDHANI POWER LIMITED

# SECTION – III

# GENERAL CONDITIONS OF CONTRACT (GCC)

# RATE CONTRACT FOR THE SUPPLY OF VARIOUS RATINGS OF OIL TYPE DISTRIBUTION TRANSFORMER IN BRPL

## CMC/BR/25-26/FK/PR/RJ/1265

# GENERAL TERMS AND CONDITIONS

## 1.0 General Instructions

1.01 All the Bids shall be prepared and submitted in accordance with these instructions.

1.02 Bidder shall bear all costs associated with the preparation and delivery of its Bid, and the Purchaser will in no case shall be responsible or liable for these costs.

1.03 The Bid should be submitted by the Bidder in whose name the bid document has been issued and under no circumstances it shall be transferred/ sold to the other party.

1.04 The Purchaser reserves the right to request for any additional information and also reserves the right to reject the proposal of any Bidder, if in the opinion of the Purchaser, the data in support of RFQ requirement is incomplete.

1.05 The Bidder is expected to examine all instructions, forms, terms & conditions and specifications in the Bid Documents. Failure to furnish all information required in the Bid Documents or submission of a Bid not substantially responsive to the Bid Documents in every respect may result in rejection of the Bid. However, the Purchaser's decision in regard to the responsiveness and rejection of bids shall be final and binding without any obligation, financial or otherwise, on the Purchaser.

## 2.0 Definition of Terms

2.01 "Purchaser" shall mean BRPL Limited, on whose behalf this bid enquiry is issued by its authorized representative / officers.

2.02 "Bidder" shall mean the firm who quotes against this bid enquiry issued by the Purchaser. "Supplier" or "Supplier" shall mean the successful Bidder and/or Bidders whose bid has been accepted by the Purchaser and on whom the "Letter of Acceptance" is placed by the Purchaser and shall include his heirs, legal representatives, successors and permitted assigns wherever the context so admits.

2.03 "Supply" shall mean the Scope of Contract as described.

2.04 "Specification" shall mean collectively all the terms and stipulations contained in those portions of this bid document known as RFQ, Commercial Terms & Condition, Instructions to Bidders, Technical Specifications and the Amendments, Revisions, Deletions or Additions, as may be made by the Purchaser from time to time.

2.05 "Letter of Acceptance" shall mean the official notice issued by the Purchaser notifying the Supplier that his proposal has been accepted and it shall include amendments thereto, if any, issued by the Purchaser. The "Letter of Acceptance" issued by the Purchaser shall be binding on the "Supplier" The date of Letter of Acceptance shall be taken as the effective date of the commencement of contract.

2.06 "Month" shall mean the calendar month and "Day" shall mean the calendar day.

2.07 "Codes and Standards" shall mean all the applicable codes and standards as indicated in the Specification.

2.08 "Offer Sheet" shall mean Bidder's firm offer submitted to BRPL in accordance with the specification.

2.09 "Contract" shall mean the "Letter of Acceptance" issued by the Purchaser.

2.10 "Contract Price" shall mean the price referred to in the "Letter of Acceptance".

2.11 "Contract Period" shall mean the period during which the "Contract" shall be executed as agreed between the Supplier and the Purchaser in the Contract inclusive of extended contract period for reason beyond the control of the Supplier and/or Purchaser due to force majeure.

2.12 "Acceptance" shall mean and deemed to include one or more of the following as will be stipulated in the specification:

a) The written acceptance of material by the inspector at suppliers works to ship the materials.

b) Acceptance of material at Purchaser site stores after its receipt and due inspection/ testing and release of material acceptance voucher.

c) Where the scope of the contract includes supply, acceptance shall mean issue of necessary equipment / material takeover receipt after installation & commissioning and final acceptance.

**3.0 Contract Documents & Priority**

3.01 Contract Documents: The terms and conditions of the contract shall consist solely of these RFQ conditions and the offer sheet.

3.02 Priority: Should there be any discrepancy between any term hereof and any term of the Offer Sheet, the terms of these RFQ shall prevail.

**4.0 Scope of Supply - General**

4.01 The "Scope of Supply" shall be on the basis of Bidder's responsibility, completely covering the obligations, responsibility and supplies provided in this Bid enquiry whether implicit or explicit.

4.02 Bidder shall have to quote for the Bill of quantities as listed in Section – IV of this RFQ.

4.03 Quantity variation and additional requirement if any shall be communicated to successful bidder during project execution.

4.04 All relevant drawings, data and instruction manuals.

## 5.0 Quality Assurance and Inspection

5.01 Immediately on award of contract, the bidder shall prepare detailed quality assurance plan / test procedure identifying the various stages of manufacture, quality checks performed at each stage, raw material inspection and the Customer hold points. The document shall also furnish details of method of checking, inspection and acceptance standards / values and get the approval of Purchaser before proceeding with manufacturing. However, Purchaser shall have right to review the inspection reports, quality checks and results of suppliers in house inspection department which are not Customer hold points and the supplier shall comply with the remarks made by purchaser or his representative on such reviews with regards to further testing, rectification or rejection, etc.

5.02 Witness and Hold points are critical steps in manufacturing, inspection and testing where the supplier is obliged to notify the Purchaser in advance so that it may be witnessed by the Purchaser. Final inspection is a mandatory hold point. The supplier needs to proceed with the work past a hold point only after clearance by purchaser or a witness waiver letter from BRPL.

5.03 The performance of waiver of QA activity by Purchaser at any stage of manufacturing does not relieve the supplier of any obligation to perform in accordance with and meet all the requirements of the procurement documents and also all the codes & reference documents mentioned in the procurement document nor shall it preclude subsequent rejection by the purchaser.

5.04 On completion of manufacturing the items can be dispatched only after issue of shipping release by the Purchaser.

5.05 All testing and inspection shall be done without any extra cost.

5.06 Purchaser reserve the right to send any material out of the supply to any recognized laboratory for testing and the cost of testing shall be borne by the Purchaser. In case the material is found not in order with the technical requirement / specification, the charges along with any other penalty which may be levied is to be borne by the bidder. To avoid any complaint the supplier is advised to send his representative to the stores to see that the material sent for testing is being sealed in the presence of bidders representative.

5.07 Bidder has to sign quality agreement before supply of the material.

## 6.0 Packing, Packing List & Marking

6.01 Packing: Supplier shall pack or shall cause to be packed all Commodities in boxes and containers and otherwise in such a manner as shall be reasonably suitable for shipment by road or rail to BRPL without undue risk of damage in transit.

6.02 Packing List: The contents of each package shall be itemized on a detailed list showing the exact weight and the extreme outside dimensions (length, width and eight) of each container or box. One copy of the packing list shall be enclosed in each package delivered. There shall also be enclosed in one package a master packing list identifying each individual package,

which is part of the shipment. On any packaging where it is not feasible to place the packing list inside the container, all pertinent information shall be stenciled on the outside and will thus constitute a packing list.

**7.01 Prices basis for supply of materials**

Bidders require quoting their prices on Landed Cost Basis and separate price for each item.
For Supply to BRPL Delhi the price shall be inclusive of packing, forwarding, GST and freights. The above supply prices shall also include unloading at site stores. Transit and storage insurance will be arranged by BRPL; however bidder to furnish required details in advance for arranging the same by BRPL.

**8.0 Variation in taxes, duties & levies:**

8.01 The total order value shall be adjusted on account of any variations in Statutory Levies imposed by Competent Authorities by way of fresh notification(s) within the stipulated delivery period only. However, in case of reduction in taxes, duties and levies, the benefits of the same shall be passed on to BUYER.

8.02 No other Taxes, Duties & Levies other than those specified above will be payable by BUYER except in case of new Levies, Taxes & Duties imposed by the Competent Authorities by way of fresh notification(s) subsequent to the issue of PURCHASE ORDER but within the stipulated delivery period.

8.03 Notwithstanding what is stated above, changes in Taxes, Duties & Levies shall apply only to that portion of PURCHASE ORDER not executed on the date of notification by Competent Authority. Further, changes in Taxes, Duties & Levies after due date of Delivery shall not affect PURCHASE ORDER Terms and Value.

8.04 PURCHASE ORDER value shall not be subject to any variation on account of variation in Exchange rate(s).

**9.0 Taxes & Duties on raw materials & bought out components:**

9.01 Taxes & Duties on raw materials & bought out components are included in Order Value and are not subject to any escalation or variation for any reason whatsoever.

9.02 Taxes & Duties on raw materials & bought out components procured indigenously are included in Order Value and are not subject to any escalation or variation for any reason whatsoever.

**10.0 Terms of payment and billing**

10.01 For Supply of Equipments:

- 100% payment shall be made within 45 days from the date of receipt of material at store/ site against submission of 10 % performance bank guarantee. (Refer 10.01)

10.02 Bidder to submit the following documents against dispatch of each consignment:

i) Consignee copy of LR
ii) Supplier detailed invoice showing commodity description, quantity, unit price, total price and basis of delivery.
iii) Original certificate issued by BRPL confirming receipt of material at site and acceptance of the same.
iv) Dispatch clearance / inspection report in original issued by the inspection authority
v) Packing List.
vi) Test Reports
vii) Guarantee Certificate.
viii) Insurance policy to be obtained by supplier

## 11.0 Price Validity

11.01 All bids submitted shall remain valid, firm and subject to unconditional acceptance by BRPL Delhi for 120 days post bid-date. For awarded suppliers, the prices shall remain valid and firm till contract completion.

## 12.0 Performance Guarantee

12.01 Bidder shall initially submit the PBG within 28 days of placement of RC for 1% of RC Value (including GST) valid till RC validity period plus three month claim period. If there is extension in RC validity date, the BG shall be extended accordingly .

Upon submission of the performance security, the EMD shall be released.

Thereafter bidder shall submit PBG on Purchase Order (PO) basis for 10% of the PO value (including GST).The Performance Bond shall be valid for a period of twenty four months (24) from the date of the commissioning or thirty months (30) from the date of receipt of material (last consignment of PO) at site/stores whichever is earlier plus 3 months towards claim period. It shall be in accordance with one of the following terms:

a) Depositing pay order /demand draft of the relevant amount directly with BRPL at the address listed above or as otherwise specified by BRPL, either of which shall constitute the Performance Bond hereunder; or

b) Bank guarantee from any nationalized bank in favour of BSES RAJDHANI POWER LTD (BRPL). The performance Bank guarantee shall be in the format as specified by BRPL.

## 13.0 Forfeiture

13.01 Each Performance Bond established under Clause 10.0 shall contain a statement that it shall be automatically and unconditionally forfeited without recourse and payable against the presentation by BRPL of this Performance Bond to the ICICI Bank at Mumbai, or to the relevant company/ correspondent bank referred to above, as the case may be, together with a simple statement that supplier has failed to comply with any term or condition set forth in the Contract.

13.02 Each Performance Bond established under will be automatically and unconditionally forfeited without recourse if BRPL in its sole discretion determines that supplier has failed to comply with any term or condition set forth in the contract.

**14.0 Release**

All Performance Bonds will be released without interest within seven (7) days from the last date up to which the Performance Bond has to be kept valid (as defined in Clause 10.0) except for the case set forth in Clause 21.0.

**15.0 Defects Liability Period**

15.01 The bidder to Guarantee the materials / items supplied against any defect of failure, which arise due to faulty materials, workmanship or design for the entire defects liability period. The Defect liability period shall be for 10 years with maintaining resistance less than 5 ohms from the date of commissioning or 6 months from the date of delivery whichever is earlier. If during the defects liability period any materials / items are found to be defective, these shall be replaced or rectified by the bidder at his own cost within 30 days from the date of receipt of intimation.

**16.0 Return, Replacement or Substitution.**

BRPL shall give Supplier notice of any defective Commodity promptly after becoming aware thereof. BRPL may in its discretion elect to return defective Commodities to Supplier for replacement, free of charge to BRPL, or may reject such Commodities and purchase the same or similar Commodities from any third party. In the latter case BRPL shall furnish proof to Supplier of the cost of such substitute purchase. In either case, all costs of any replacement, substitution, shipping, labour and other related expenses incurred in connection with the return and replacement or for the substitute purchase of a Commodity hereunder should be for the account of Supplier. BRPL may set off such costs against any amounts payable by BRPL to Supplier. Supplier shall reimburse BRPL for the amount, if any, by which the price of a substitute Commodity exceeds the price for such Commodity as quoted in the Bid.

**17.0 Effective Date of Commencement of Contract:**

17.01 The date of the issue of the Letter of Acceptance shall be treated as the effective date of the commencement of Contract.

**18.0 Time – The Essence of Contract**

18.01 The time and the date of completion of the "Supply"" as stipulated in the Letter Of Acceptance / Purchase order issued to the Supplier shall be deemed to be the essence of the "Contract". The Supply has to be completed not later than the aforesaid Schedule and date of completion of supply.

**19.0 The Laws and Jurisdiction of Contract:**

19.01 The laws applicable to this Contract shall be the Laws in force in India.

19.02 All disputes arising in connection with the present Contract shall be settled amicably by mutual consultation failing which shall be finally settled as per the rules of Arbitration and Conciliation Act, 1996 at the discretion of Purchaser. The venue of arbitration shall be at Mumbai in India

**20.0 Events of Default**

20.01 Events of Default. Each of the following events or occurrences shall constitute an event of default ("Event of Default") under the Contract:

a) Supplier fails or refuses to pay any amounts due under the Contract;

b) Supplier fails or refuses to deliver Commodities conforming to this RFQ/ specifications, or fails to deliver Commodities within the period specified in P.O. or any extension thereof

c) Supplier becomes insolvent or unable to pay its debts when due, or commits any act of bankruptcy, such as filing any petition in any bankruptcy, winding-up or reorganization proceeding, or acknowledges in writing its insolvency or inability to pay its debts; or the Supplier's creditors file any petition relating to bankruptcy of Supplier;

d) Supplier otherwise fails or refuses to perform or observe any term or condition of the Contract and such failure is not remediable or, if remediable, continues for a period of 30 days after receipt by the Supplier of notice of such failure from BRPL.

**21.0 Consequences of Default.**

a) If an Event of Default shall occur and be continuing, BRPL may forthwith terminate the Contract by written notice.

b) In the event of an Event of Default, BRPL may, without prejudice to any other right granted to it by law, or the Contract, take any or all of the following actions;

i) present for payment to the relevant bank the Performance Bond;

ii) purchase the same or similar Commodities from any third party; and/or

iii) recover any losses and/or additional expenses BRPL may incur as a result of Supplier's default.

**22.0 Penalty for Delay**

22.01 If supply of items / equipments is delayed beyond the supply schedule as stipulated in purchase order then the Supplier shall be liable to pay to the Purchaser as penalty for delay, a sum of 1% (one percent) of the contract price for every week delay or part thereof for undelivered quantities.

22.02 The total amount of penalty for delay under the contract will be subject to a maximum of ten percent (10%) of the contract price for undelivered quantities.

22.03 The Purchaser may, without prejudice to any method of recovery, deduct the amount for such damages from any amount due or which may become due to the Supplier or from the Performance Bond or file a claim against the supplier.

**23.0 Force Majeure**

23.01 General

An "Event of Force Majeure" shall mean any event or circumstance not within the reasonable control directly or indirectly, of the Party affected, but only if and to the extent that:

i) Such event or circumstance materially and adversely affects the ability of the affected Party to perform its obligations under this Contract, and the affected Party has taken all reasonable precautions, due care and reasonable alternative measures in order to prevent or avoid the effect of such event on the affected party's ability to perform its obligations under this Contract and to mitigate the consequences thereof.

ii) For the avoidance of doubt, if such event or circumstance would not have materially and adversely affected the performance of the affected party had such affected party followed good industry practice, such event or circumstance shall not constitute force majeure.

iii) Such vent is not the direct or indirect result of the failure of such Party to perform any of its obligations under this Contract.

iv) Such Party has given the other Party prompt notice describing such events, the effect thereof and the actions being taken in order to comply with above clause.

23.02 Specific Events of Force Majeure subject to the provisions of above clause, Events of Force Majeure shall include only the following to the extent that they or their consequences satisfy the above requirements:

23.03 Mitigation of Events of Force Majeure Each Party shall:

i) Make all reasonable efforts to prevent and reduce to a minimum and mitigate the effect of any delay occasioned by an Event of Force Majeure including recourse to alternate methods of satisfying its obligations under the Contract;

ii) Use its best efforts to ensure resumption of normal performance after the termination of any Event of Force Majeure and shall perform its obligations to the maximum extent practicable as agreed between the Parties; and

iii) Keep the other Party informed at regular intervals of the circumstances concerning the event of Force Majeure, with best estimates as to its likely continuation and what measures or contingency planning it is taking to mitigate and or terminate the Event of Force Majeure.

23.04 Burden of Proof In the event that the Parties are unable in good faith to agree that a Force Majeure event has occurred to an affected party, the parties shall resolve their dispute in accordance with the provisions of this Agreement. The burden of proof as to whether or not a force majeure event has occurred shall be upon the party claiming that the force majeure event has occurred and that it is the affected party.

23.05 Termination for Certain Events of Force Majeure. If any obligation of any Party under the Contract is or is reasonably expected to be delayed or prevented by a Force Majeure event for a continuous period of more than 3 months, the Parties shall promptly discuss in good faith how to proceed with a view to reaching a solution on mutually agreed basis. If a solution on mutually agreed basis cannot be arrived at within a period of 30 days after the expiry of the period of three months, the Contract shall be terminated after the said period of 30 days and neither Party shall be liable to the other for any consequences arising on account of such termination.

23.06 Limitation of Force Majeure event. The Supplier shall not be relieved of any obligation under the Contract solely because cost of performance is increased, whether as a consequence of adverse economic consequences or otherwise.

23.07 Extension of Contract Period due to Force Majeure event The Contract period may be extended by mutual agreement of Parties by way of an adjustment on account of any period during which an obligation of either Party is suspended due to a Force Majeure event.

23.08 Effect of Events of Force Majeure. Except as otherwise provided herein or may further be agreed between the Parties, either Party shall be excused from performance and neither Party shall be construed to be in default in respect of any obligations hereunder, for so long as failure to perform such obligations shall be due to and event of Force Majeure."

**24.0 Transfer And Sub-Letting**

24.01 The Supplier shall not sublet, transfer, assign or otherwise part with the Contract or any part thereof, either directly or indirectly, without prior written permission of the Purchaser.

**25.0 Recoveries**

25.01 Whenever under this contract any money is recoverable from and payable by the bidder, the purchaser shall be entitled to recover such sum by appropriating in part or in whole by detecting any sum due to which any time thereafter may become due from the supplier in this or any other contract. Should the sum be not sufficient to cover the full amount recoverable the bidder shall pay to the purchaser on demand the remaining balance.

**26.0 Waiver**

26.01 Failure to enforce any condition herein contained shall not operate as a waiver of the condition itself or any subsequent breach thereof.

**27.0 Indemnification**

27.01 Notwithstanding contrary to anything contained in this RFQ, Supplier shall at his costs and risks make good any loss or damage to the property of the Purchaser and/or the other Supplier engaged by the Purchaser and/or the employees of the Purchaser and/or employees of the other Supplier engaged by the Purchaser whatsoever arising out of the negligence of the Supplier while performing the obligations under this contract.

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RAJDHANI POWER LIMITED

## SECTION – IV: QUANTITY AND DELIVERY REQUIREMENT

| Sl. No. | Item Description | Specification | Requirement | Delivery Schedule | Location |
|---|---|---|---|---|---|
| BRPL,DELHI | | | | | |
| 1 | Rate Contract for the supply of 1000 kVA Oil type Distribution Transformer | SECTION V | 109 Nos. | Within 02 months from the date of drawing approval received | Stores BRPL Delhi |
| 2 | Rate Contract for the supply of 1600 kVA Oil type Distribution Transformer | SECTION V | 149 Nos. | | |
| TOTAL | | | | | |

**Annexure –I**

**BID FORM**

**Supply of Various ratings of Distribution Transformers**

To
Head of the Department Contracts & Materials BSES Rajdhani Power Ltd BSES Bhawan, Nehru Place New Delhi– 110019
Sir,

We understand that BRPL is desirous of procuring "1600 kVa Oil Type Distribution Transformer" in its licensed distribution network area in Delhi. Having examined the Bidding Documents for the above named works, we the undersigned, offer to deliver the goods in full conformity with the Drawings, Conditions of Contract and specifications for the sum of AS PER PRICE BID ENCLOSED or such other sums as may be determined in accordance with the terms and conditions of the contract .The above amounts are in accordance with the Price Schedules attached herewith and are made part of this bid.

If our Bid is accepted, we undertake to deliver the entire goods as per delivery schedule given by you from the date of award of purchase order/letter of intent.

If our Bid is accepted, we will furnish a performance bank guarantee for an amount of 10% (Ten) percent of the total contract value for due performance of the Contract in accordance with the General Conditions of Contract.

We agree to abide by this Bid for a period of 120 days from the date fixed for bid opening under clause 9.0 of GCC, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

We declare that we have studied the provision of Indian Income Tax Law and other Indian Laws for supply of equipments/materials and the prices have been quoted accordingly.

Unless and until Letter of Intent is issued, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.

We understand that you are not bound to accept the lowest, or any bid you may receive.

There is provision for Resolution of Disputes under this Contract, in accordance with the Laws and Jurisdiction of Contract, Clause 19 of GCC .

Dated this.....day of.....20.....
Signature..... In the capacity of……
.....duly authorized to sign for and on behalf of (IN BLOCK CAPITALS)……

**Annexure -II**

**FORMAT FOR EMD BANK GUARANTEE**

***(To be issued in a Non Judicial Stamp Paper of Rs.50/-purchased in the name of the bank)***

Whereas [name of the Bidder] (hereinafter called the "Bidder") has submitted its bid dated [date of submission of bid] for the supply of [name and/or description of the goods] (hereafter called ''the Bid"). KNOW ALL PEOPLE by these presents that WE [name of bank]at[Branch Name and address],having our registered office at[address of the registered office of the bank](herein after called —"the Bank"),are bound unto BSES Rajdhani Power Ltd., with its Corporate Office at BSES Bhawan Nehru Place, New Delhi -110019, (herein after called —the "Purchaser") in the sum of_____ for which payment well and truly to be made to the said Purchaser, the Bank binds itself, its successors, and assigns by these presents. Sealed with the Common Seal of the said Bank this____ day of__ 20__.

THE CONDITIONS of this obligation are:

If the Bidder withdraws its Bid during the period of bid validity specified by the Bidder on the Bid Form; or

If the Bidder, having been notified of the acceptance of its Bid by the Purchaser during the period of bid validity:

fails or refuses to execute the Contract Form ,if required; or
fails or refuses to furnish the performance security, In accordance with the Instructions to Bidders/GENERAL CONDITIONS.;

We undertake to pay to the Purchaser up to the above amount upon receipt of its first written demand, without the Purchaser having to substantiate its demand, provided that is its demand the purchaser will note that amount claimed by it is due to it, owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including thirty (30) days after the period of bid validity, and any demand in respect thereof should reach the Bank not later than the above date.

(Signature of the bank)

Signature of the witness

**Annexure-III**

**PRICE FORMAT**

ENQUIRY NO & DATE: NIT: CMC/BR/25-26/FK/PR/RJ/1265

**PRICE SCHEDULE**

| ITEM DESCRIPTION | QTY AS PER RFQ | UOM | EX-WORKS RATE/ UNIT | CGST (%) | CGST AMOUNT | SGST (%) | SGST AMOUNT | IGST (%) | IGST AMOUNT | FREIGHT | LANDED RATE/ UNIT | TOTAL LANDED COST (INR) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1600 kVA Oil Type Distribution Transformer | 149 | Nos. | | | | | | | | | | |
| 1000 kVA Oil Type Distribution Transformer | 109 | Nos. | | | | | | | | | | |

Note:
1. Prices shall be Firm
2. The prices received without break up of ex works, Freight, GST are liable for rejection
3. Please indicate the exact percentage of taxes in figures and words.
4. If there is a discrepancy between the unit price and the total price THE UNIT PRICE shall prevail.
5. Bidders are requested to attach the covering letter head along with the price bid indicating reference no and date.

Bidders seal & signature

**Annexure – IV**

Enquiry No. : CMC/BR/25-26/FK/PR/RJ/1265

## COMMERCIAL TERMS AND CONDITIONS

| S/NO | ITEM DESCIPTION | AS PER BRPL | CONFIRMATION OF BIDDER |
|---|---|---|---|
| 1 | Validity of prices | 120 days from date of offer | |
| 2 | Price basis | Price Variation, FOR Delhi store basis, Prices shall be inclusive of all taxes & duties, freight upto Delhi stores. Unloading at stores be in vendor's scope Transit insurance in BRPL scope | |
| 3 | Payment Terms | 100% payment within 45 days after receipt of material at stores | |
| 4 | Delivery schedule | As per our requirement | |
| 5 | Defect Liability Period | Warrant shall be 10 years with maintaining resistance less than 5 Ohms from the date of commission or 6 months from the date of delivery whichever is earlier. | |
| 6 | Penalty for delay | 1% per week of delay of undelivered units or part thereof subject to maximum of 10% of total PO value of undelivered units | |
| 7 | Performance Bank Guarantee | Bidder shall initially submit the PBG within 28 days of placement of RC for 1% of RC Value (including GST) valid till RC validity period plus three month claim period. If there is extension in RC validity date, the BG shall be extended accordingly .Upon submission of the performance security, the EMD shall be released.<br><br>Thereafter bidder shall submit PBG on Purchase Order (PO) basis for 10% of the PO value (including GST).The Performance Bond shall be valid for a period of twenty four months (24) from the date of the commissioning or thirty months (30) from the date of receipt of material (last consignment of PO) at site/stores whichever is earlier plus 3 months towards claim period. | |

**ANNEXURE - V**

ENQUIRY NO: CMC/BR/25-26/FK/PR/RJ/1265

**NO DEVIATION SHEET**

| SL NO | SL NO OF TECHNICAL SPECIFICATION | DEVIATION, IF ANY |
|---|---|---|
| | | |

**SIGNATURE & SEAL OF BIDDER**

**NAME OF BIDDER**

BSES
RAJDHANI POWER LIMITED

**CHECK LIST**

| Sl No | Item Description | YES/NO |
|---|---|---|
| 1 | INDEX | YES/NO |
| 2 | COVERING LETTER | YES/NO |
| 3 | BID FORM (UNPRICED) DULY SIGNED | YES/NO |
| 4 | BILL OF MATERIAL (UNPRICED) | YES/NO |
| 5 | TECHNICAL BID | YES/NO |
| 6 | ACCEPTANCE TO COMMERCILAL TERMS & CONDITIONS | YES/NO |
| 7 | FINANCIAL BIDS (IN SEALED ENVELOPE) | YES/NO |
| 8 | EMD IN PRESCRIBED FORMAT | YES/NO |
| 9 | DEMANT DRAFT OF RS 1180/- DRAWN IN FAVOUR OF | BSES RAJDHANI POWER LTD |
| 10 | POWER OF ATTORNEY/ AUTHORISATION LETTER FOR SIGNING THE BID | YES/NO |

**Annexure VI**

## FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT

(To be signed & stamped by the bidder along-with bid)

BSES Rajdhani Power Ltd (BRPL) intends to use reverse auction through SAP-SRM tool as an integral part of entire tendering process. All bidders who are techno-commercially qualified on the basis of tender requirements shall participate in the reverse auction.

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

1. In case of bidding through Internet medium, bidders are advised to ensure availability of all associated infrastructure as required to participate in the reverse auction event. Inability to bid due to telephone glitch, internet response issues, software & hardware hangs/failures, power failures or any other reason shall not be the responsibility of BRPL.

2. In case bidder fails to participate in the reverse auction event due to any reason whatsoever, it shall be presumed that the bidder has no further discounts to offer and the initial bid submitted by them as a part of tender shall be considered as bidder's Final .No Regret offer.Any off-line price bids received from a bidder in lieu of non-participation in the reverse auction event shall be rejected by BRPL.

3. The bidder is advised to understand the auto bid process t safeguard themselves against any possibility of non-participation in the reverse auction event.

4. The bidder shall be prepared with competitive price quotes during the day of reverse auction event.

5. The prices quoted by bidder in reverse auction event shall be on FOR Landed cost BRPL Store/site basis inclusive of all relevant taxes, duties, levies, transportation charges etc.

6. The prices submitted by the bidder during reverse auction event shall be binding on the bidder.

7. The bidder agrees to non-disclosure of trade information regarding bid details e.g. purchase, identity, bid process/technology, bid documentation etc.

8. BRPL will make every effort to make the bid process transparent. However award decision of BRPL will be final and binding on the bidder.

9. The prices submitted during reverse auction event shall be binding on the bidder.

10. No request for Time extension of the reverse auction event shall be considered by BRPL.

**Seal & Signature of Bidder**

BSES
RAJDHANI POWER LIMITED

**SECTION – V**

**TECHNICAL SPECIFICATIONS (TS)**

# Various Ratings of Oil Type Distribution Transformer

**CMC/BR/25-26/FK/PR/RJ/1265**

**The detailed technical specifications of Distribution Transformer**

BSES

# Technical Specification of Conventional Oil filled Distribution Transformer

## Specification no – BSES-TS-12-TRDU-R1

| | | |
|---|---|---|
| Rev: | | 1 |
| Date: | | 07/12/2022 |
| Prepared by | Vani Sood / Pronab Bairagi | |
| | Jeena Borana | |
| Reviewed by | Srinivas Gopu | |
| | Amit Tomar | |
| Approved by | Gaurav Sharma | |
| | Gopal Nariya | |

## INDEX

## Record of Revision

| SI No. | Revision No | Item/Clause No. | Nature of change | Approved by |
|---|---|---|---|---|
| 1 | R1 | 3.23, 3.24.3, 3.25.7, 3.26.7, 3.30, 3.35, 4.2.8.6,4.2.10.7 | Transformer rating added | GN/GS |
| 2 | R1 | 3.29 | Material of HV busbar revised | GN/GS |
| 3 | R1 | 3.31 | Material of LV busbar revised | GN/GS |
| 4 | R1 | 4.2.8.2 | Rating of additional neutral bushing added | GN/GS |
| 5 | R1 | 5.21 | Buckholz relay for 1000 KVA added | GN/GS |
| | | | | |
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| | | | | |

## 1.0 Scope of Supply

For scope of supply, refer annexure – A.

## 2.0 Codes & standards

a) Materials, equipment and methods used in the manufacture of Transformer shall conform to the latest edition of below mentioned standards.

b) Vendor shall possess valid BIS Certification.

| | |
|---|---|
| IS 1180 | Outdoor type oil immersed distribution transformer upto and including 2.5MVA,33kV |
| IS 2026 | Power Transformers |
| IS 2026-4 | Terminal Marking, tappings and Connections for Power Transformers. |
| IS:3347 | Dimensions for Porcelain Transformer bushing |
| IS:3637 | Gas operated relays |
| IS:3639 | Fitting & Accessories for power transformers |
| IS:4201 | Application guide for CT's |
| IS:8478 | Application guide for On-load tap changer |
| IS:10028 | Code of practice for selection, installation & maintenance of transformers |
| IS 5561 | Electrical Power Connectors |
| IS 5 | Colors for ready mix paints |
| IS:335 | Insulating oil |
| IS 6272 | Industrial cooling fans |
| IS 12615 | Three phase induction motors |
| IS/IEC 60034 | Rotating Electrical Machines. (e.g. For Cooler Fan Motors.) |
| IS/IEC 60071 | Co-ordination of Insulation. |
| IS 16227/IEC 61869 | Current Transformers. |
| IS 8468/ IEC 60214 | On Load Tap Changers |
| IS2026-7/IEC 60076-7 | Loading Guide for Oil-Immersed Power Transformers. |
| IS 2026-8 /IEC 60076-8 | Application Guide for Power Transformers. |
| IS 2026-10/IEC 60076-10 | Determination of Transformer Sound Levels. |
| IS/IEC 60529 | Degrees of Protection Provided by Enclosures (IP Code). |

| | |
|---|---|
| IS/IEC 60947 | Low-Voltage Switchgear and Control gear. |
| IS/IEC 60137 | Bushing for alternating voltage above 1000V |
| IS:1271/IEC 60085 | Thermal evaluation and classification of electrical insulation |
| IEC 60076 | Power transformers. |
| IEC 60156 | Method for Determination of the Electric Strength for Insulating Oils. |
| IEC 60296 | Specification for Unused Mineral Insulating Oils for Transformers and Switchgear. |
| IEC 60445 | Basic& Safety principles for man-machine interface, marking and identification, Identification of Equipment Terminals and conductor terminals |
| BS 148 | Determination of Transformer and Reactor Sound Levels. |
| BS 223 | Application Guide for Power Transformers. |
| BS 2562 | Terminal and Tapping Markings for Power Transformers. |
| | Indian Electricity Rules |
| | Indian Electricity Act |
| | CBIP manual |

In the event of direct conflict between various order documents, the precedence of authority of documents shall be as follows -

i. Guaranteed Technical Particulars (GTP)
ii. This Specification
iii Indian Standards / IEC standards
iv Approved Vendor Drawings
iv. Other documents

### 3.0 Major Design Criteria & Parameters of the Transformer

| Sr No | Description | Data by purchaser |
|---|---|---|
| 3.1 | Voltage variation on supply side | + / - 10 % |
| 3.2 | Frequency variation on supply side | +/ - 5 % |
| 3.3 | Transient condition | - 20 % or + 10 % combined variation of voltage and frequency |
| 3.4 | Service Condition | Refer Annexure B |
| 3.5 | Insulation level | Class A |

| | | |
|---|---|---|
| 3.6 | Location of equipment | Generally Outdoor but may be located indoor also with poor ventilation |
| 3.7 | Reference design ambient temperature | 50 deg C |
| 3.8 | Type | Oil immersed, core type, step down |
| 3.9 | Type of cooling | ONAN |
| 3.10 | Reference standard | IS 2026/IS 1180 |
| 3.11 | No. of phases | 3 |
| 3.12 | No. of windings per phase | 2 |
| 3.13 | Rated frequency ( Hz ) | 50 Hz |
| 3.14 | Highest system voltage HV side | 12 kV |
| 3.15 | Highest system voltage LV side | 460 volt |
| 3.16 | Lightning Impulse withstand voltage , kV peak | |
| 3.16.1 | For nominal system voltage of 11 kV | 75 |
| 3.17 | Power Frequency Withstand Voltage kV rms | |
| 3.17.1 | For nominal system voltage of 11 kV | 28 |
| 3.17.2 | For nominal system voltage of 415 V | 3 |
| 3.18 | Clearances Phase to Phase , mm | |
| 3.18.1 | For nominal system voltage of 11 kV | 180 |
| 3.18.2 | For nominal system voltage of 415 V | 25 |
| 3.19 | Clearances Phase to Earth , mm | |
| 3.19.1 | For nominal system voltage of 11 kV | 120 |
| 3.19.2 | For nominal system voltage of 415 V | 25 |
| 3.20 | System Fault Level , HV side | 350 MVA |
| 3.21 | System Fault Level , LV side | 35 MVA |
| 3.22 | System earthing | |
| 3.22.1 | HV | Solidly earthed |
| 3.22.2 | LV | Solidly earthed |
| 3.23 | Ratings | 250/400/630/1000/1600/2000/2500 (R1) kVA |

| | | |
|---|---|---|
| 3.24 | Percentage Impedance at 75 deg C | |
| 3.24.1 | 250/400/630 kVA | 4.5 % with IS tolerance |
| 3.24.2 | 1000 kVA | 5.0 % with IS tolerance |
| 3.24.3 | 1600/2000/2500 (R1) kVA | 6.25% with IS tolerance |
| 3.25 | Max Total losses(No Load+ Load Losses at 75ºC) at 50% of the rated load , kW | |
| 3.25.1 | 250 kVA | 0.98 |
| 3.25.2 | 400 kVA | 1.225 |
| 3.25.3 | 630 kVA | 1.86 |
| 3.25.4 | 1000 kVA | 2.79 |
| 3.25.5 | 1600 kVA | 4.2 |
| 3.25.6 | 2000 kVA | 5.05 |
| 3.25.7 | 2500 kVA | 6.15 (R1) |
| 3.26 | Max Total losses(No Load+ Load Losses at 75ºC) at 100% of the rated load , kW | |
| 3.26.1 | 250 kVA | 2.93 |
| 3.26.2 | 400 kVA | 3.45 |
| 3.26.3 | 630 kVA | 5.3 |
| 3.26.4 | 1000 kVA | 7.7 |
| 3.26.5 | 1600 kVA | 11.8 |
| 3.26.6 | 2000 kVA | 15 |
| 3.26.7 | 2500 kVA | 18.5 (R1) |
| 3.27 | Phase CT Ratio , Amp | |
| 3.27.1 | 250 kVA | 400/5 |
| 3.27.2 | 400 kVA | 600/5 |
| 3.27.3 | 630 kVA | 1000/5 |
| 3.27.4 | 1000 kVA | 1500/5 |
| 3.27.5 | 1600 kVA | 2500/5 |
| 3.27.6 | 2000 kVA | 3000/5 |
| 3.27.7 | 2500 kVA | 4000/5 (R1) |

| | | |
|---|---|---|
| 3.28 | HV cable size for all sizes / Conductor size | 11 kV (E) grade , A2XCEWY 3C x 150 sqmm |
| 3.29 | Busbar size on HV side for cable termination, mm x mm | 50x10-Tinned copper |
| 3.30 | LV cable size, 650 /1100 V grade , A2XY cable single core 630 sqmm unarmoured (approx cable dia 40 mm)/ A2XY Cable single core 1000sqmm(Approx dia. 48mm) | Cable |
| 3.30.1 | 250 kVA | 1 runs per phase + 1 runs in Neutral-single core 630 sqmm cable |
| 3.30.2 | 400 kVA | 2 runs per phase + 2 runs in Neutral-single core 630 sqmm cable |
| 3.30.3 | 630 kVA | 3 runs per phase + 3 runs in Neutral-single core 630 sqmm cable |
| 3.30.4 | 1000 kVA | 4 runs per phase + 4 runs in Neutral-single core 630 sqmm cable |
| 3.30.5 | 1600 KVA | 3 runs per phase + 3 runs in Neutral-single core 1000 sqmm cable |
| 3.30.6 | 2000 kVA | 4 runs per phase + 4 runs in Neutral-single core 1000 sqmm cable |
| 3.30.7 | 2500 kVA (R1) | 5 runs per phase + 5 runs in Neutral-single core 1000 sqmm cable |
| 3.31 | Busbar size on LV side for cable termination, mm x mm | |
| 3.31.1 | 250/400/630 kVA (R1) | |
| 3.31.1.1 | Phase | 100 x 12-Alumium |
| 3.31.1.2 | Neutral | 100 x 12-Alumium |
| 3.31.2 | 1000kVA | |
| 3.31.2.1 | Phase | 2 runs 100 x 12-Aluminium |
| 3.31.2.2 | Neutral | 2 runs 100 x 12-Aluminium |

| | | |
|---|---|---|
| 3.31.3 | 1600kVA | |
| 3.31.3.1 | Phase | 2 runs 160 x 12-Aluminium |
| 3.31.3.2 | Neutral | 2 runs 160 x 12-Aluminium |
| 3.31.4 | 2000kVA | |
| 3.31.4.1 | Phase | 2 runs 160 x 12-Aluminium |
| 3.31.4.2 | Neutral | 2 runs 160 x 12-Aluminium |
| 3.31.5 | 2500kVA (R1) | |
| 3.31.5.1 | Phase | 2 runs 160 x 15-Aluminium |
| 3.31.5.2 | Neutral | 2 runs 160 x 15-Aluminium |
| 3.32 | Maximum Overall Dimension Acceptable ( length x width x height), mm x mm x mm | |
| 3.32.1 | 250 KVA | 1500 x1300x 1700 |
| 3.32.2 | 400 kVA | 1500X1500X2000 |
| 3.32.3 | 630 kVA | 1700X1700X2200 |
| 3.32.4 | 1000 kVA | 1900X1900X2500 |
| 3.32.5 | 1600 kVA | 2300X2000X2600 |
| 3.32.6 | 2000 kVA | 2500X2000X2600 |
| 3.32.7 | 2500 kVA (R1) | 2800X2300X2700 |
| 3.33 | Short Circuit withstand Capacity of the transformer | |
| 3.33.1 | Three phase dead short circuit at secondary terminal with rated voltage maintained on the other side | For 3 secs. |
| 3.33.2 | Single phase short circuit at secondary terminal with rated voltage maintained on other side | For 3 secs. |
| 3.34 | Overload Capability | As per IS 2026/IEC 60905 |

| | | |
|---|---|---|
| 3.35 | Noise Level (R1) | 400/630/1000/1600/2000/2500 KVA-56/57/58/60/61/62 Db respectively |
| 3.36 | Radio Influence Voltage | Maximum 250 microvolt |
| 3.37 | Harmonic suppression | Transformer to be designed for suppression of 3rd, 5th, 7th harmonic voltages and high frequency disturbances. |
| 3.38 | Partial Discharge | Transformer to be free from partial discharge upto 120 % of rated voltage as the voltage is reduced from 150 % of rated voltage i.e. there shall be no significant rise above background level |
| 3.39 | Tappings | Off Circuit taps on HV winding , +10% to - 10% in steps of 2.5 % , change of taps by externally operated switch |
| 3.39.1 | Rotary tap switch operating voltage | 11 kV |
| 3.39.2 | Rotary tap switch current rating, Amp. | |
| 3.39.2.1 | 250 KVA | 20 Amps |
| 3.39.2.2 | 400 kVA | 60 Amp |
| 3.39.2.3 | 630 / 1000 kVA | 100 Amp |
| 3.39.2.4 | 1600/2000 kVA | 150 Amp |
| 3.39.2.5 | 2500 kVA (R1) | 200 Amp |

## 4.0 Construction & Design

| | | |
|---|---|---|
| 4.1 | Type | Double Copper wound, three phase, oil immersed, with ONAN cooling, with off circuit tap changer |
| 4.2 | **Major Parts** | |
| 4.2.1 | **Tank** | |
| 4.2.1.1 | Type | Non sealed type with conservator as |

| | | |
|---|---|---|
| | | per manufacturer's standard. |
| 4.2.1.2 | Material of Construction | Robust mild steel plate without pitting and low carbon content |
| 4.2.1.3 | Plate Thickness | Adequate for meeting the requirements of pressure and vacuum type tests as per IS |
| 4.2.1.4 | Welding features | i) All seams and joints shall be double welded<br>ii) All welding shall be stress relieved for sheet thickness greater than 35 mm<br>iii) All pipes, radiators, stiffeners, welded to the tank shall be welded externally |
| 4.2.1.5 | Tank features | i) Adequate space at bottom for collection of sediments<br>ii) Stiffeners provided for rigidity and designed to prevent accumulation of water<br>iii) No internal pockets in which gas/air can accumulate<br>iv) No external pocket in which water can lodge<br>v) Tank bottom with welded skid base<br>vi) Tank cover sloped to prevent retention of rain water<br>vii) Minimum disconnection of pipe work and accessories for cover lifting<br>viii) Tanks shall be of a strength to prevent permanent deformation during lifting , jacking, transportation with oil filled.<br>ix) Tank to be designed for oil filling |

| | | |
|---|---|---|
| | | under vacuum<br>x) Tank cover fitted with lifting lug<br>xi) Tank cover bent at all the ends<br>xii) Minimum disconnection of pipe work and accessories for cover lifting |
| 4.2.1.6 | Flanged type adequately sized inspection cover rectangular in shape required for | i) HV line bushing<br>ii) LV line bushing<br>iii) LV neutral bushing<br>iv) Core / Winding |
| 4.2.1.7 | Fittings and accessories on main tank | See under fittings and accessories. |
| 4.2.2 | **Conservator for the main tank** | |
| 4.2.2.1 | Capacity | Adequate between highest and lowest visible levels to meet the requirement of expansion of oil volume in the transformer and cooling equipment from minimum ambient temperature to maximum operating temperatures. |
| 4.2.2.2 | Conservator oil preservation system | Conventional |
| 4.2.2.3 | Conservator features | i) Conservator shall be bolted into position so that it can be removed for cleaning / other maintenance purposes<br>ii) Main pipe from tank shall project about 20 mm above conservator bottom for creating a sump for collection of impurities<br>iii) Conservator minimum oil level corresponding to minimum temperature shall be well above the sump level.<br>iv) Conservator to main tank piping shall be supported at minimum two points. |

| | | |
|---|---|---|
| 4.2.2.4 | Fittings and accessories on main tank conservator | i) Prismatic oil gauge with MINIMUM, NORMAL and MAXIMUM marking<br>ii) End Cover<br>iii) Oil Filling Hole with cap<br>iv) Silica Gel Dehydrating Breather with oil seal and dust filter with clear acrylic single piece clearly transparent cover resistant to UV rays(1kg). Breather shall be of Flanged type in circular shape with 4 no.holes of ½ inches with hardware of M10 bolts. Silica gel shall be of round ball type of 2.5mm dia.<br>v) Drain Plug<br>vi) Air release plug as required<br>vii) Pressure/ Vacuum gauge<br>viii) Magnetic Oil Gauge with LOW LEVEL ALARM |
| 4.2.3 | **Radiators** | Detachable type |
| 4.2.3.1 | Thickness | Minimum 1.2 mm |
| 4.2.4.2 | Features | With lifting lugs, air release plug, |
| 4.2.5 | **Core** | |
| 4.2.5.1 | Material | High grade , non ageing, low loss, high permeability, grain oriented, cold rolled silicon steel lamination. Core shall be low loss of 1Watt/kG (max) |
| 4.2.5.2 | Grade | Premium Grade minimum M3 or better |
| 4.2.5.3 | Lamination thickness | 0.23 mm Max. |
| 4.2.5.4 | Design Flux Density at rated conditions at principal tap | As per Manufacturer design. |
| 4.2.5.5 | Maximum Flux Density at 12.5 % over | 1.9 T |

| | | |
|---|---|---|
| | excitation / over fluxing | |
| 4.2.5.6 | Core Design Features | i) Core shall be in the form of step and stack in three limb format.<br>Note: Wound core shall not be acceptable<br>ii) Magnetic circuit designed to avoid short circuit paths within core or to the earthed clamping structures<br>iii) Magnetic circuit shall not produce flux components at right angles to the plane of lamination to avoid local heating<br>iv) Least possible air gap and rigid clamping for minimum core loss and noise generation<br>v) Adequately braced to withstand bolted faults on secondary terminals without mechanical damage and damage/ displacement during transportation and positioning.<br>vi) Percentage harmonic potential with the maximum flux density under any condition limited to avoid capacitor overloading in the system<br>vii) All steel sections used for supporting the core shall be thoroughly sand blasted after cutting , drilling, welding<br>viii) Provision of lifting lugs for core coil assembly<br>ix) Supporting framework designed not to obstruct complete drainage of oil from transformer |

| | | |
|---|---|---|
| 4.2.6 | **Winding** | |
| 4.2.6.1 | Material | Electrolytic Copper |
| 4.2.6.2 | Maximum Current Density allowed | 3 Amp per sq mm at all taps. |
| 4.2.6.3 | Winding Insulating material | Class A , non catalytic, inert to transformer oil, free from compounds liable to ooze out, shrink or collapse. |
| 4.2.6.4 | Winding Insulation | Uniform |
| 4.2.6.5 | Design features | i) Type of winding<br>a. LV: Sprial/Helical<br>b. HV: Crossover/Disc<br>Note: Foil winding shall not be acceptable<br>ii) Stacks of winding to receive adequate shrinkage treatment<br>iii) Connections braced to withstand shock during transport, switching, short circuit, or other transients.<br>iv) Minimum out of balance force in the transformer winding at all voltage ratios.<br>v) Conductor width on edge exceeding six times its thickness<br>vi) Transposed at sufficient intervals.<br>vii) Coil assembly shall be suitably supported between adjacent sections by insulating spacers + barriers<br>viii) Winding leads rigidly supported , using guide tubes if practicable<br>ix) Winding structure and major insulation not to obstruct free flow of oil through ducts<br>x) Provision of taps as per clause 3.39 |

| | | |
|---|---|---|
| 4.2.7 | **Transformer Oil** | |
| 4.2.7.1 | Type | Should be in accordance with specification as per Annex C of this document |
| 4.2.8 | **Bushings and Terminations** | |
| 4.2.8.1 | Type of HV side bushing | HV bushing should be top mounted. Outdoor, Pocelain, rated voltage and creepage as per 31mm/kV with voltage class of 12kV respectively |
| 4.2.8.2 | Type of LV side bushing | LV bushing should be top mounted. Outdoor, Porcelain, rated voltage and creepage as per 31mm/kV with voltage class of 1.1 kV respectively<br>Additional neutral bushing of porcelain outside on top of LT cable box with brass palm connector (as per IS 3347) shall be provided. The rating of additional neutral bushing should be same as phase bushing (R1).<br>Connection between the main neutral and additional neutral shall be provided. For extra neutral bushing, protection box shall be provided in order to prevent ingress of water. |
| 4.2.8.2.1 | Essential provision for LV side line bushing | It shall be complete with brass palm with aluminium busbar of size shall be as per clause 3.31.<br>Bimetallic strip to be provided |
| 4.2.8.2.2 | Essential provision for LV side neutral bushing | In case of neutral bushing the stem and busbar shall be integral without bolted, threaded, brazed joints. Busbar size shall be as per clause 3.31 |
| 4.2.8.3 | Arcing Horns | Not required |
| 4.2.8.4 | Support insulators inside HV cable box | Epoxy resin cast, rated voltage 12 kV |

| | | |
|---|---|---|
| | if provided | |
| 4.2.8.5 | Termination on HV side bushing | By bimetallic terminal connectors suitable for ACSR/AAAC conductor / Cable connection through cable box with disconnecting link suitable for 11kV(E) grade,A2XFY 3Cx 150sqmm |
| 4.2.8.6 | Termination of LV side bushing | By bimetallic terminal connectors suitable for LV Cable size of 650/1100VGrade, A2XY Cable single core 630sqmm (Approx dia 40mm) / A2XY Cable single core 1000sqmm (Approx dia. 48mm) for 1600/2000/2500 (R1) KVA. |
| 4.2.8.7 | Minimum creepage distance of all bushings and support insulators. | 31mm/KV |
| 4.2.8.8 | Protected creepage distance | At least 50 % of total creepage distance |
| 4.2.8.9 | Continuous Current rating | Minimum 20 % higher than the current corresponding to the minimum tap of the transformer |
| 4.2.8.10 | Rated thermal short time current | 25 times the rated current for 2 sec |
| 4.2.8.11 | Atmospheric protection for clamp and fitting of iron and steel | Hot dip galvanizing as per IS 2633 |
| 4.2.8.12 | Bushing terminal lugs in oil and air | Brass palm connector for HV & LV side (as per IS: 3347) |
| 4.2.8.13 | Sealing washers /Gasket ring | Nitrile cork rubber(RC70C)/ Expanded TEFLON(PTFE) as applicable. |
| 4.2.9 | **HV & LV cable box** | Required |
| 4.2.9.1 | Material of Construction | Sheet Steel min. 2.5 mm thick |
| 4.2.9.2 | Cable entry | At bottom through detachable gland plate with cable clamps of non magnetic material |

| | | |
|---|---|---|
| 4.2.9.3 | Cable size for HV | 11 kV (E) grade , A2XFY 3C x 150 sqmm |
| 4.2.9.4 | Cable size for LV | LV cable size, 650 /1100 V grade, A2XY cable single core 630 sqmm unarmoured (approx cable dia 40 mm) / A2XY Cable single core 1000sqmm (Approx dia. 48mm) for 1600/2000/2500 (R1) KVA. |
| 4.2.9.5 | Cable size for LV Neutral | LV cable size, 650 /1100 V grade, A2XY cable single core 630 sqmm unarmoured (approx cable dia 40 mm) / A2XY Cable single core 1000sqmm (Approx dia. 48mm) for 1600/2000/2500 (R1) KVA. |
| 4.2.9.6 | Detachable Gland Plate material for HV, LV, LV Neutral box | i) MS for HV cable box<br>ii) Al for LV cable box. |
| 4.2.9.7 | Gland plate thickness for HV, LV, LV Neutral box | i) 3 mm for HV side cable box<br>ii) 5 mm for LV cable box. |
| 4.2.9.8 | Cable gland for HV cables | Nickel plated brass double compression weatherproof cable gland |
| 4.2.9.9 | Cable lug for HV, LV, LV Neutral cables | i) Double hole Aluminium lugs for LV & Neutral side<br>ii) Single hole Aluminum lugs for HV side |
| 4.2.9.10 | Essential parts | i) Flange type removable front cover with handles min two nos.<br>ii) Aluminium for LV with bimetallic strips and tinned copper for HV Busbar of adequate size for Purchaser's cable termination with busbar supports<br>iii) Earthing boss for the cable box<br>iv) Earthing link for the gasketted joints at two point for each joint<br>v) Earthing provision for cable Armour/ Screen |

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| | | vi) Flanged type inspection cover on top for bushing inspection and maintenance with handle<br>vii) Drain plug<br>viii) Rainhood on gasketted vertical joint<br>ix) Danger / caution plate |
| 4.2.9.11 | Terminal Clearances | 700mm, Minimum |
| 4.2.9.12 | Termination height required for cable termination | 1000mm, Minimum |
| 4.2.10 | **Current Transformers** | |
| 4.2.10.1 | Provision | On all three phases on LV side |
| 4.2.10.2 | Mounting | On LV side bushings on all three phases with the help of fibre glass mounting plate affixed to main tank by nut bolt arrangement |
| 4.2.10.3 | Maintenance requirements | Replacement should be possible by removing fixing nut of mounting plate after removal of LT cable without disturbing LT bushing |
| 4.2.10.4 | Accuracy Class | 0.5 |
| 4.2.10.5 | Burden | 10VA |
| 4.2.10.6 | Type | Resin Cast Ring type suitable for outdoor use. |
| 4.2.10.7 | CT ratio | |
| | 250 KVA | 400/5 |
| | 400kVA | 600/5 |
| | 630kVA | 1000/5 |
| | 1000kVA | 1500/5 |
| | 1600kVA | 2500/5 |
| | 2000kVA | 3000/5 |
| | 2500kVA (R1) | 4000/5 |
| 4.2.10.8 | **CT terminal Box** | |
| 4.2.10.8.1 | Size | 650 mm height x 750 mm width x 275 |

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| | | mm depth. |
| 4.2.10.8.2 | Fixing of instrument / meters within box | On slotted channel 40 x 12 mm size, channel fixed on vertical slotted angle 40 x 40 mm size at two ends |
| 4.2.10.8.3 | No of horizontal channels to be provided | Four |
| 4.2.10.8.4 | Fixing of terminals within the box | On horizontal slotted channel with the help of C channel available with the terminals |
| 4.2.10.8.5 | Location | On tank wall |
| 4.2.10.8.6 | Box door design | Openable from outside with antitheft hinge, padlock facility, door fixed by stainless steel allen screw M6 size , door shall have canopy for rain protection |
| 4.2.10.8.7 | Terminal strip | Nylon 66 material, minimum 4 sq mm, screw type for control wiring and potential circuit. |
| 4.2.10.8.8 | Cables and wires | PVC insulated, extruded PVC inner sheathed, armoured, extruded PVC outer sheathed 1100 V grade control cable as per latest edition of IS 1554 part 1 minimum 2.5 sq mm for signals and 4 sq mm for CT with multi strand copper conductor |
| 4.2.10.8.9 | Cable Glands | Nickel plated brass double compression weatherproof cable gland |
| 4.2.10.8.10 | Lugs on wires | Tinned copper pre insulated Pin, Ring, Fork type as applicable |
| 4.2.10.8.11 | Potential signal in CT box | i) Tapped from main LV busbar<br>ii) Neutral Link and Fuse to be provided by bidder for PT |
| 4.2.10.8.12 | Essential provision | Wiring diagram to be fixed on the back |

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| | | of door along with CT spec. on Aluminum engraved plate fixed by rivet. |
| 4.2.11 | **Off Circuit tap Switch** | |
| 4.2.11.1 | Range /Step | Off circuit taps on HV winding, +10% to -10% in steps of 2.5%, change of taps by externally operated switch. |
| 4.2.11.2 | Type | Rotary type, 3 pole gang operated, draw out type |
| 4.2.11.3 | Operating Voltage | 11kV |
| 4.2.11.4 | Rated Current for tap Switch | i) 400 kVA - 60 Amps<br>ii) 630/1000 kVA - 100 Amps<br>iii) 1600/2000kVA-150 Amps<br>iv) 2500kVA- 200 Amps |
| 4.2.11.5 | Operating Handle | External at suitable height to be operated from ground level. |
| 4.2.11.6 | Essential provision | Tap position indicator, direction changing facility, locking arrangement, and caution plate metallic fixed by rivet. |
| 4.2.12 | **Pressure Relief Device** | |
| 4.2.12.1 | Type | Pressure Relief Valve (PRV) |
| 4.2.12.2 | Auxiliary contacts | 2 NO |
| 4.2.13 | **Winding and Oil Temperature scanner** | Required |
| 4.2.13.1 | PT 100 sensor | For measurement of Oil temperature LV winding temperature. |
| 4.2.13.2 | No of potential free trip contacts | 2 NO |
| 4.2.13.3 | No of potential free alarm contacts | 2 NO |
| 4.2.13.4 | Auxiliary Supply | 240 AC, Single phase, 50Hz. Tapped from LV side busbar through a MCB located inside box. |

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| 4.2.13.5 | Communication port | RS 485 port for interfacing with FRTU on Modbus protocol.<br>Battery/Super capacitor for data transmission to SCADA in the event of Auxiliary supply fail |
| 4.2.13.5 | Fixing of instrument | On side wall of tank |
| 4.2.14 | **Auxiliary Relay (hand reset type)** | Required to identify the type of fault/indication. |
| 4.2.14.1 | Quantity | 4 no's Separate auxiliary relay to be provided for PRV, MOG,WTI/OTI, Buchholz relay. |
| 4.2.14.2 | Potential free contacts | 2 NO |
| 4.2.14.3 | Auxiliary supply | 240V AC |
| 4.3 | **Hardware** | |
| 4.3.1 | External | Hot dip galvanized bolts |
| 4.3.2 | Internal | Cadmium plated except special hardware for frame parts and core assembly as per manufacturer's design |
| 4.4 | **Gasket** | |
| 4.4.1 | For Transformer , surfaces interfacing with oil like inspection cover etc. | Nitrile cork rubber RC70C grade |
| 4.4.2 | For Cable boxes, Marshalling box, etc. | Neoprene rubber based/ cork nitrile |
| 4.5 | Valves | |
| 4.5.1 | Material of construction | Brass / gun metal |
| 4.5.2 | Type | Both end flanged gate valve / butterfly valve depending on application |
| 4.5.3 | Size | As per manufacturer's standard |
| 4.5.4 | Essential provision | Position indicator, locking rod, padlocking facility, valve guard, cover plate. |
| 4.6 | Cable routing on Transformer | Control cables for accessories on transformer tank shall be routed through perforated GI trays |

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| 4.6.1 | Control cable specification | PVC insulated, extruded PVC inner sheathed, armoured, extruded PVC outer sheathed 1100 V grade control cable as per latest edition of IS 1554 part 1 minimum 2.5 sq mm for signals and 4 sq mm for CT with multi strand copper conductor |
| 4.6.2 | Specification of wires to be used inside marshalling box. | PVC insulated multi-strand flexible copper wires of minimum 2.5 sq mm size, 1100 V grade as per latest edition of relevant IS |
| 4.7 | Terminal Blocks to be used by the vendor | Nylon 66 material, minimum 4 sq mm, Stud type screw driver operated type for control wiring and potential circuit. |
| 4.7.1 | Essential provision for CT terminals | Sliding link type disconnecting terminal block Stud type screwdriver operated with facility for CT terminal shorting material of housing melamine/ Nylon66 |
| 4.8 | Cable glands to be used by the vendor | Nickel plated brass double compression weatherproof cable gland |
| 4.9 | Cable lugs to be used by the vendor | |
| 4.9.1 | For power cables | Long barrel medium duty Aluminium lug with knurling on inside surface. |
| 4.9.2 | For Control Cable | Tinned copper pre insulated Pin, Ring, Fork type as applicable |
| 4.10 | Painting of transformer, Radiator, marshalling box for CT, cable boxes etc. | |
| 4.10.1 | Surface preparation | By 7 tank pretreatment process or shot blasting method |
| 4.10.2 | Finish on internal surfaces of the transformer | Bright Yellow heat resistant and oil resistant paint two coats. Paint shall |

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| | | neither react nor dissolve in hot transformer insulating oil. |
| 4.10.3 | Finish on inner surface of the CT terminal box, HV/LV/LVN cable box | White Polyurethane paint anti condensation type two coats , minimum dry film thickness 80 microns |
| 4.10.4 | Finish on outer surface of the transformer, radiator, CT terminal box, HV/LV/LVN cable box | Battle ship Grey shade 632 Polyurethane paint two coats, minimum dry film thickness 80 microns |
| 4.10.5 | Frame parts | Battle ship grey shade 632 IS 5, 80 micron minimum insulating oil resistant paint. Paint shall neither react nor dissolve in hot transformer insulating oil. |

## 5.0 Fittings and Accessories on Transformer

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| 5.1 | Rating and Diagram Plate | Required |
| 5.1.1 | Material | Anodized aluminum 16SWG |
| 5.1.2 | Background | SATIN SILVER |
| 5.1.3 | Letters, diagram & border | Black |
| 5.1.4 | Process | Etching |
| 5.1.5 | Rating and Diagram Plate details | Following details shall be provided on rating and diagram plate as a minimum<br>i) type/kind of transformer with winding material<br>ii) standard to which it is manufactured<br>iii) manufacturer's name;<br>iv) transformer serial number;<br>v) month and year of manufacture<br>vi) rated frequency in Hz<br>vii) rated voltages in kV<br>viii) number of phases<br>ix) rated power in kVA<br>x) type of cooling (ONAN)<br>xi) rated currents in A |

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| | | xii) vector group connection symbol<br>xiii) 1.2/50µs wave impulse voltage withstand level in kV<br>xiv) power frequency withstand voltage in kV<br>xv) impedance voltage at rated current and frequency in percentage at principal, minimum and maximum tap<br>xvi) Max. Total losses at 50 % rated load<br>xvii) Max. Total losses at 100 % rated load<br>xviii) Load loss at 50% & 100% rated load<br>xix) No-load loss at rated voltage and frequency<br>xx) Energy efficiency level.<br>xxi) continuous ambient temperature at which ratings apply in deg C<br>xxii) top oil and winding temperature rise at rated load in deg C;<br>xxiii) winding connection diagram with taps and table of tapping voltage, current and power<br>xxiv) transport weight of transformer<br>xxv) weight of core and windings<br>xxvi) Weight of core<br>xxvii) Weight of winding<br>xxviii) total weight<br>xxix) volume of oil<br>xxx) weight of oil<br>xxxi) name of the purchaser<br>xxxii) PO no and date |

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| | | xxxiii)Guarantee period |
| 5.2 | Terminal marking Plate for Bushing, anodized aluminium black lettering on satin silver background both inside cable boxes near termination and on cable box cover (all fixed by rivet) | Required |
| 5.3 | Company Monogram Plate fixed by rivet | Required |
| 5.4 | Lifting Lug to lift complete transformer with oil | Required |
| 5.5 | Lifting lug for top cover | Required |
| 5.6 | Lashing Lug | Required |
| 5.7 | Jacking Pad with Haulage hole to raise or lower complete transformer with oil | Required |
| 5.8 | Detachable Bidirectional flat roller Assembly | Required |
| 5.8.1 | Roller center to center distance | Minimum 900 mm on the side of HV and LV cable box<br>Maximum 800 mm on the other side (perpendicular to HV, LV cable box). |
| 5.8.2 | Essential provision | Roller dia 150 mm min., roller to be fixed in such a way so that the lowermost part of the skid is above ground by at least 100 mm when the transformer is installed on roller. |
| 5.9 | Pockets for ordinary thermometer on tank cover with metallic identification plate fixed by rivet. | Required |
| 5.10 | Drain valve (gate valve) for the main tank with cork above ground by 150mm minimum with padlocking and valve guard with | Required |

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| | metallic identification plate fixed by rivet. | |
| 5.11 | Filter valve (gate valve) at top with padlocking and valve guard with metallic identification plate fixed by rivet. | Required |
| 5.12 | Air Release Plug on tank cover with metallic identification plate fixed by rivet. | Required |
| 5.13 | Earthing pad on tank for transformer earthing complete with non ferrous nut ., bolt, washers, spring washers etc. with metallic identification plate fixed by rivet | Required |
| 5.14 | Rainhood for vertical gasketted joints , in cable boxes, Conservator | Required Not required as per Annexure A Scope of supply |
| 5.15 | Earthing bridge by copper strip jumpers on all gasket joints at at least two points for electrical continuity | Required |
| 5.16 | Skid base welded type with haulage hole | Required |
| 5.17 | Core , Frame to tank Earthing | Required |
| 5.18 | Danger plate made of Anodized aluminum with white letters on red background on Transformer, cable boxes (all fixed by rivet) | Required |
| 5.19 | Caution plate for Off Circuit tap changer fixed by rivet. | Required |
| 5.20 | MOG with auxiliary contact wired upto Terminal Box | Required |
| 5.21 | Buchholz relay for transformer 1000kVA (R1) and above | Required |
| 5.22 | Pressure relief valve | Required |

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| 5.23 | WTI & OTI Temperature Scanner | Required |
| 5.24 | Auxiliary relays (4 no's) | Required |
| 5.25 | LT cable support-By aluminium clamp fixed on the on MS bracket of size 50x 10 supported from the tank wall shall be provided . | Required |
| 5.26 | HT cable support-By GI clamp fixed on the on MS bracket of size 50x 10 supported from the tank wall shall be provided. | Required |

## 6.0 Approved make of components

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| 6.1 | CT | Pragati / ECS / Kappa/Mehru/Continental/Nortex |
| 6.2 | Bushings | Baroda Bushing/Jaipur glass/CJI |
| 6.3 | Tap Changer | Alwaye /Paragon |
| 6.4 | MOG | Sukrut/Atvus |
| 6.5 | Valves | Newman/ATAM |
| 6.6 | CRGO | Nippon/JFE/Posco/Thyson kkurup |
| 6.7 | Copper | Birla copper/Sterlite |
| 6.8 | Pre compressed Pressboard | Raman Board, Mysore/ Senapathy Whiteley |
| 6.9 | Laminated Wood | Permalli Wallance / Rochling Engineers |
| 6.10 | Oil | Apar/Savita/Raj Petro/Gandhaar |
| 6.11 | Steel | TATA/Jindal/SAIL |
| 6.12 | Lugs/Glands | Jainson/Dowells/Comet |
| 6.13 | Radiators | CTR/Hi-Tech Radiators /Tarang Engineers |
| 6.14 | WTI/OTI | Precimeasure/ Pecon |
| 6.15 | Buchholz Relay | Sukrut/Atvus |
| 6.16 | Auxiliary Relay | GE/Alstrom |
| 6.17. | Aluminium | Hindalco, Nalco, Sterlite, Birla |

Note – Any other make of component offered by the bidder maybe reviewed & approved by purchaser

## 7.0 Quality assurance

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| 7.1 | Quality Assurance program | To be submitted before contract award.<br>Program shall contain following<br>i) The structure of the organization<br>ii) The duties and responsibilities assigned to staff ensuring quality of work.<br>iii) The bidder should have qualified technical & dedicated QA personnel at various stages of manufacture & testing.<br>iv) Factory inspection of bidder may be carried out to ascertain the quality system and process in place at manufacturing facility. The same is applicable to bidders not approved with BSES.<br>v) The system for purchasing, taking delivery and verification of materials<br>vi) The system for ensuring quality of workmanship<br>vii) The system for control of documentation<br>viii) The system for the retention of records<br>ix) The arrangements for the Supplier's internal auditing<br>x) A list of the administration and work procedures required to achieve and verify Contract's quality requirements. These procedures shall be made readily available to the Purchaser for inspection on request |
| 7.2 | Quality Plan | To be submitted by the successful bidder for approval. Plan shall contain following as a minimum<br>i) An outline of the proposed work and programm sequence |

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| | | ii) The structure of the Supplier's organisation for the contract<br>iii) The duties and responsibilities assigned to staff ensuring quality of work for the contract<br>iv) Inspection Hold and notification points mutually agreed.<br>v) Submission of engineering documents required by the specification<br>vi) The inspection of materials and components on receipt<br>vii) Reference to the Supplier's work procedures appropriate to each activity<br>viii) Inspection during fabrication/ construction<br>ix) Final inspection and test<br>x) Successful bidder shall include submittal of Mills invoice, Bill of lading, Mill's test certificate for grade, physical tests, dimension, specific watt loss per kG for the core material to the purchaser for verification in the quality plan suitably |
| 7.3 | Manufacturing Quality Assurance Plan | Refer Annexure D |

## 8.0 Progress Reporting

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| 8.1 | Outline Document | To be submitted for purchaser approval for outline of production, inspection, testing, packing, dispatch, documentation programme |
| 8.2 | Detailed Progress report | To be submitted to Purchaser once a month containing<br>i) Progress on material procurement<br>ii) Progress on fabrication<br>iii) Progress on assembly<br>iv) Progress on internal stage inspection<br>v) Reason for any delay in total programme<br>vi) Details of test failures if any in manufacturing stages<br>vii) Progress on final box up |

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| | | viii) Constraints<br>ix) Forward path |

## 9.0 Inspection & testing

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| 9.1 | Inspection and Testing during manufacture | Only type tested equipment shall be acceptable |
| 9.1.1 | Tank and Conservator | i) Check correct dimensions between wheels demonstrate turning of wheels through 90 deg and further dimensional check.<br>ii) Check for physical properties of materials for lifting lugs, jacking pads etc. All load bearing welds, including lifting lug welds shall be subjected to<br>iii) required load tests.<br>iv) Leakage test of the conservator.<br>v) Certification of all test results.<br>vi) Oil leakage test .<br>vii) Vacuum and Pressure test on tank as type test as per IS |
| 9.1.2 | Core | |
| 9.1.2.1 | Mother Core coil | Verification & inspection of the mother coil at port & putting stamp & seal may be inspected by BSES. |
| 9.1.2.2 | Core sample type testing | Reconciliation of mother coil by checking stamp & seal at factory before slitting. One sample of CRGO to be sealed for testing at ERDA/CPRI. Following Tests shall be conducted on the sample per P.O.<br><br>i) Specific core loss measurement<br>ii) Magnetic polarization<br>iii) Magnetic permeability<br>iv) Specific core loss measurement after accelerated ageing test<br>v) Surface insulation resistivity<br>vi) Electrical resistivity measurement<br>vii) Stacking factor<br>viii) Ductility(Bend test)<br>ix) Lamination thickness<br>x) Magnetization characteristics (B-H curve) |
| 9.1.2.3 | Core cutting | Bidder should have in house core cutting |

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| | | facility for proper monitoring & control on quality. In case it is done outside cutting shall be done in presence of BSES. |
| 9.1.2.4 | Core physical verification | i) Check on the quality of varnish if used on the stampings.<br>a) Measurement of thickness and hardness of varnish on stampings.<br>b) Solvent resistance test to check that varnish does not react in hot oil.<br>c) Check over all quality of varnish by sampling to ensure uniform hipping colour, no bare spots. No ever burnt varnish layer and no bubbles on varnished surface.<br>ii) Check on the amount of burns.<br>iii) Bow check on stampings.<br>iv) Check for the overlapping of stampings. Corners of the sheet are to be apart.<br>v) Visual and dimensional check during assembly stage.<br>vi) Check on complete core for measurements of iron-loss and check for any hot spot by exciting the core so as to induce the designed value of flux density in the core.<br>vii) Check for inter laminar insulation between core sectors before and after pressing.<br>viii) Visual and dimensional checks for straightness and roundness of core, thickness of limbs and suitability of clamps.<br>ix) High voltage test (2 KV for one minute) between core and clamps.<br>Certification of all test results. |
| 9.1.2.5 | Documents verification | Following documents to be submitted during the stage inspection<br>i) Invoice of supplier<br>ii) Mills test certificates<br>iii) Packing list<br>iv) Bill of lading<br>v) Bill of entry certificates by customs |
| 9.1.3 | Insulating Materials | i) Sample check for physical properties of materials. |

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| | | ii) Check for dielectric strength.<br>iii) Visual and dimensional checks.<br>iv) Check for the reaction of hot oil on insulating materials.<br>v) Certification of all test results. |
| 9.1.4 | Windings | i) Sample check on winding conductor for mechanical properties and electrical conductivity.<br>ii) Visual and dimensional check on conductor for scratches, dept. mark etc.<br>iii) Sample check on insulating paper for PE value, Bursting strength, Electric strength.<br>iv) Check for the reaction of hot oil on insulating paper.<br>v) Check for the bending of the insulating paper on conductor.<br>vi) Check and ensure that physical condition of all materials taken for winding is satisfactory and free of dust.<br>vii) Check for absence of short circuit between parallel strands.<br>viii) Check for Brazed joints wherever applicable.<br>ix) Measurement of voltage ratio to be carried out when core/ yoke is completely restocked and all connections are ready.<br>x) Certification of all test results. |
| 9.1.4.1 | Checks before drying process | i) Check conditions of insulation on the conductor and between the windings.<br>ii) Check insulation distance between high voltage connection distance between high voltage connection cables and earthed and other live parts.<br>iii) Check insulation distance between low voltage connection and earthed and other parts.<br>iv) Insulation test of core earthing.<br>v) Check for proper cleanliness<br>vi) Check tightness of coils i.e. no free |

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| | | movement.<br>vii) Certification of all test results. |
| 9.1.4.2 | Checks during drying process | i) Measurement and recording of temperature and drying time during vacuum treatment.<br>ii) Check for completeness of drying.<br>iii) Certification of all test results. |
| 9.1.5 | Oil sample testing | One sample of oil drawn from every lot of transformer offered for inspection should be tested at CPRI/ERDA lab for tests as listed under Table-1 of IS:1866 (2000). The cost of this testing should be included within the cost of transformer. |
| 9.1.6 | Test on fittings and accessories | As per manufacturer's standard |
| 9.2 | Routine tests | The sequence of routine testing shall be as follows<br>i) Visual and dimension check for completely assembled transformer<br>ii) Measurements of voltage ratio<br>iii) Measurements of winding resistance at principal tap and two extreme taps.<br>iv) Vector Group and polarity test<br>v) Measurements of insulation resistance*<br>vi) Separate sources voltage withstand test.<br>vii) Measurement of iron losses and exciting current at rated frequency and 90%, 100% and 110% rated voltage.<br>viii) Induced voltage withstand test.<br>ix) Load losses measurement at 50 % & 100 % of load.<br>x) Impedance measurement of principal tap (HV and LV) of the transformer.<br>xi) Routine test of tanks<br>xii) Induced voltage withstand test (to be repeated if type tests are conducted).<br>xiii) Measurement of Iron loss (to be repeated if type test are conducted).<br>xiv) Measurement of capacitance and Tan Delta for transformer winding and Tan Delta for transformer oil (for |

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| | | all transformers).<br>xv) Ratio of CT<br>xvi) Oil leakage test on completely assembled transformer<br>xvii) Magnetic balance test<br>xviii) Power frequency voltage withstand test on all auxiliary circuits<br>xix) Certification of all test results.<br>xx) Temperature Rise Test #<br><br>Note:<br>a) *Insulation resistance measurement shall be carried out at 5kV for HV and 1kV for LV. Value of IR should not be less than 1000 Mohms. Polarization Index (PI = $IR_{10min}/IR_{1min}$) should not be less than 1.5 (If one minute IR value is above 5000 Mohms and it is not be possible to obtain an accurate 10 minutes reading, in such cases polarization index can be disregarded as a measure of winding condition.)<br><br>b) #Temperature rise test may be necessary to be carried one unit/lot. Purchaser's engineer, will at its discretion, select transformer for temp. rise test from any lot offered for inspection at manufacturer's works and witness the same for comparison with ERDA/CPRI type test results<br>c) BSES may appoint recognized testing authority like CPRI /ERDA lab with their instruments & engineer's team and measure no load loss, load loss and percentage impedance of the transformer at supplier's works at our own cost. Bidder shall agree and give them full co-operation during their stay & testing at shop floor. The losses & impedance values so obtained will be considered as final. |
| 9.3 | Acceptance test at NABL lab | Bidder should have in-house NABL accredited testing facility.<br>In case of unavailability of same, one Transformer of each rating shall be randomly selected and sealed by BSES representative for complete acceptance |

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| | | test as per IS 1180 ( including temperature test) at third party NABL Lab. Tests shall be conducted once per Rate contract. |
| 9.4 | Type Tests | On one transformer of each rating and type at CPRI/ERDA.<br>i) Impulse withstand test on all three HV limbs of the transformers for chopped wave as per standard<br>ii) Temperature rise test as per IS<br>iii) Dissolved gas analysis before and after Temperature Rise Test<br>iv) Pressure and Vacuum test on tank<br><br>Note – Purchaser may choose to carry out short circuit, impulse & temperature rise test on one unit from a lot offered from inspection at CPRI/ERDA |
| 9.5 | Special Tests | On one transformer of each rating and type<br>i) Dynamic & Thermal (3 sec) Short Circuit Test as per IS 2026<br>ii) Measure of zero seq. impedance (Cl. 16.10 IS 2026 Part I).<br>iii) Measurement of acoustic noise level (Cl. 16.12 of IS 2026 Part I).<br>iv) Measurement of harmonic level on no load current.<br>v) Paint adhesion test.<br>vi) High voltage withstand test shall be performed on the auxiliary equipment and wiring after complete assembly. Cost of such tests, if extra, shall be quoted separately by the Bidder. |
| 9.6 | Notification to bidders | In case bidder had conducted type & special tests from CPRI/ERDA on BSES design and there is no design change in the transformer less than 10 years from the date of the bid opening, then bidder need not to conduct the type test from CPRI/ERDA lab.<br>The bidder shall submit the under taking that there is no change in design with respect to type tested design. |
| | | The product offered must be of type tested |

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| | | quality.<br>In case the product offered is never type & special tested the same (as per above clause 9.4.& 9.5), is to be conducted by bidder at his own cost at CPRI/ERDA |
| 9.7 | Customer Hold Point | i) GTP & Drawings approval<br>ii) Core Inspection(See Cl No 9.1.2) Sample to be tested at CPRI/ERDA for each lot.<br>iii) Tank Pressure & vacuum Test<br>iv) Core & Coil Stage inspection of each lot to be offered for final testing. |

## 10.0 Packing , Shipping, Handling and Storage

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| 10.1 | Packing | |
| 10.1.1 | Packing protection | Against corrosion, dampness, heavy rains, breakage and vibration |
| 10.1.2 | Packing for accessories and spares | Robust wooden non returnable packing case with all the above protection |
| 10.1.3 | Packing details | On each packing case details required as follows<br>i) Individual serial number;<br>ii) Purchaser's name;<br>iii) PO number;<br>iv) Destination;<br>v) Supplier's name;<br>vi) Name and address of supplier's agent<br>vii) Description and quantity<br>viii) Manufacturer’s name<br>ix) Country of origin<br>x) Case measurements<br>xi) Gross and net weights in kilograms<br>xii) All necessary slinging and stacking instructions. |
| 10.2 | Shipping | i) The bidder shall ascertain at an early date and definitely before the commencementof manufacture, any transport limitations such as weights, dimensions, road culverts, overhead lines, free access etc. from the |

| | | |
|---|---|---|
| | | manufacturing plant to the project site; and furnish to the Purchaser confirmation that the proposed packages can be safely transported, as normal or oversize packages, upto the plant site.<br>ii) Any modifications required in the infrastructure and cost thereof in this connection shall be brought to the notice of the Purchaser |
| 10.3 | Handling and Storage | As per manufacturer's instruction |

## 11.0 Deviations

Deviations from this Specification shall be stated in writing with the tender by reference to the Specification clause/GTP/Drawing and a description of the alternative offer. In absence of such a statement, requirements of the Specification shall be met without exception.

## 12.0 Drawings& Data Submission Matrix

Drawing submission shall be as per the matrix given below. All documents/ drawing shall be provided on A3/A4 sheet in box file with separators for each section. PDF shall also be provided of all documents via USB. Deviation sheet and GTP shall be provided in excel sheet.Language of the documents shall be English only. Deficient/ improper document/ drawing submission may liable for rejection.

| S.no | Documents to be submitted | With the bid | After Award | |
|---|---|---|---|---|
| | | | For Approval | Prior to dispatch |
| 1 | Copy of specification along with company seal & signature on each page. | ✓ | ✓ | |
| 2 | Guaranteed technical particulars | ✓ | ✓ | |
| 3 | Outline dimension drawing for each major component, general arrangement drawing showing component layout an general schematic diagrams. | ✓ | ✓ | |
| 4 | Type test certificates, where available, and sample routine test reports | ✓ | ✓ | |
| 5 | Detailed reference list of customers already using equipment offered during the last 5 years with particular emphasis on units of similar design and rating | ✓ | | |

| S.no | Documents to be submitted | With the bid | After Award | |
|---|---|---|---|---|
| | | | For Approval | Prior to dispatch |
| 6 | Details of manufacturers quality assurance standard and programme and ISO 9000 series or equivalent national certification. | ✓ | | |
| 7 | Deviations from this specification. Only deviations approved in writing before award of contract shall be accepted. | ✓ | | |
| 8 | Recommended spare parts and consumable items for the five years of operation with prices and spare parts catalogue with price list for future requirements. | ✓ | | |
| 9 | Transport / shipping dimension and weights, space required for handling parts for maintenance | ✓ | | |
| 10 | Write up on oil preservation system. | | ✓ | ✓ |
| 11 | Quality assurance program. | ✓ | ✓ | |
| 12 | Programme for production and testing | | ✓ | |
| 13 | General description of the equipment and all components, including brochures | | ✓ | |
| 14 | Detailed dimension drawing for all components ,general arrangement drawing showing detailed component layout and detailed schematic and wiring drawings for all components like marshalling box and OTI/WTI scanner, PRV, Buchhloz relay. Auxiliary relays | | ✓ | |
| 15 | Calculations to substantiate choice of electrical, structural, mechanical component size, ratings | | ✓ | |
| 16 | Detailed loading drawing to enable the purchaser to design and construct foundations for the transformer. | | ✓ | |
| 17 | Transport /shipping dimension with weights ,wheel base details, untanking height etc. | | ✓ | |
| 18 | Terminal arrangements and cable box details | | ✓ | |
| 19 | Flow diagram of cooling system showing no. of cooling banks | | ✓ | |
| 20 | Drawings of major components like | | ✓ | |

| S.no | Documents to be submitted | With the bid | After Award | |
|---|---|---|---|---|
| | | | For Approval | Prior to dispatch |
| | bushing,CT, OTI/WTI Scanner, PRV, Buchholz relay, Auxiliary relays, Valves, radiators etc | | | |
| 21 | Lists of makes of all fittings and accessories | | ✓ | |
| 22 | Statement drawing attention to all exposed points in the equipment at which contact with or in close proximity to other metals and stating clearly what protection is employed to prevent corrosion at each point | | ✓ | |
| 23 | Detailed installation and commissioning instructions | | | ✓ |
| 24 | Inspection and test reports carried out in manufacturers works | | | ✓ |
| 25 | Test certificates of all bought out items. and catalogues | | | ✓ |
| 26 | Operation and maintenance instructions as well as trouble shooting charts. | | | ✓ |

## Annexure A Scope of supply

**1.0 The scope of supply shall include following**

1.1 Design, manufacture, assembly, testing at stages of manufacture as per Cl. 9 of this specification, final testing at manufacturer works on completely assembled transformer before dispatch, packing, transportation, delivery and submission of all documentation for the Power transformer with all accessories as below

| Sr. No | Description | Scope of Supply |
|---|---|---|
| 1.1.1 | Fully assembled transformer with all major parts like conservator, Radiators, CT box, Fittings and accessories as per Clause 5.0 of this specification | YES |
| 1.1.2 | Off circuit tap changer as per this specification | YES |
| 1.1.3 | HV, LV, cable boxes | YES |
| 1.1.4 | Support steel material for support of cable boxes from ground | YES |
| 1.1.5 | Foundation Bolts for complete transformer | YES |
| 1.1.6 | Support structure to support of cable from the transformer tank | YES |
| 1.1.7 | Nickel Plated brass double compression glands for HV and LV, LVN cables (in case of termination by cable) | YES |
| 1.1.8 | Long barrel medium duty Aluminium lugs for power cables (in case of termination by cable) | YES |
| 1.1.9 | Nickel Plated brass double compression glands and tinned copper lugs for control cable termination in CT box for vendor's cables | YES |
| 1.1.10 | Cables and wires for transformer accessories and internal wiring of CT box | YES |
| 1.1.11 | Touch up paint, minimum 2 litres | YES |

| | | |
|---|---|---|
| 1.1.12 | Extra Transformer oil 10 % in non returnable drums | YES |
| 1.1.13 | One spare complete set of gaskets | YES |
| 1.1.14 | Routine testing as per Cl. 9.2 & 9.3 of this specification | YES |
| 1.1.15 | Type testing as per Cl. 9.4 of this specification | YES |
| 1.1.16 | Special testing as per Cl. 9.5 of this specification | YES |
| 1.1.17 | Submission of Documentation as detailed below | YES |

**Annexure B Service Conditions**

| | | |
|---|---|---|
| 1.0.0 | Delhi Atmospheric conditions | |
| a) | Average grade atmosphere : | Heavily polluted, dry |
| | Maximum altitude above sea level | 1000 M |
| b) | Ambient Air temperature | Highest 50 deg C, Average 40 deg C |
| | Design ambient temperature | 50 deg C |
| c) | Relative Humidity | 90 % Max |
| d) | Seismic Zone | 4 |
| e) | Rainfall | 750 mm concentrated in four months |

## Annexure C Technical Particulars of transformer oil

Transformer oil shall be new and conform to the following requirements:

1.0 Codes & standards

Latest revision of following codes & standards with all amendments –

| | Standard no | Title |
|---|---|---|
| 1.1 | IS 335 | New insulating oils |
| 1.2 | IS 1783 | Drums for oils |

**2.0 Properties**

The insulating material shall have following features

| Sr No | Item description | Specification requirement |
|---|---|---|
| **2.1** | **Function** | |
| 2.1.1 | Viscosity | |
| 2.1.1.1 | Viscosity at $40^0$C | 15 $mm^2$/s, Max |
| 2.1.1.2 | Viscosity at $0^0$C | 1800 $mm^2$/s, Max |
| 2.1.2 | Pour Point | - $10^0$C, Max |
| 2.1.3 | Water content | 30 mg/Kg, Max |
| 2.1.4 | Breakdown voltage | |
| 2.1.4.1 | New unfiltered oil | 30 kV, Min |
| 2.1.4.2 | After filtration | 70 kV, Min |
| 2.1.5 | Density at $20^0$C | 0.895 g/ml, Max |
| 2.1.6 | Dielectric dissipation factor at $90^0$C | 0.005, Max |
| 2.1.7 | Particle Content | Manufacturer to specify the data |
| **2.2** | **Refining/Stability** | |
| 2.2.1 | Appearance of oil | Clear, free from sediment and suspended matter |
| 2.2.2 | Acidity | 0.01 mg KOH/g, Max |
| 2.2.3 | Interfacial tension at $27^0$C | 0.04 N/m, Min |
| 2.2.4 | Total sulphur content | Manufacturer to specify the data |
| 2.2.5 | Corrosive sulfur | Not-corrosive |
| 2.2.6 | Potentially Corrosive sulfur | Not-corrosive |
| 2.2.7 | DBDS | Not detectable (<5 mg/kg) |
| 2.2.8 | Inhibitor | Not detectable (<0.01%) |
| 2.2.9 | Metal Passivator | Not detectable (<5 mg/kg) |
| 2.2.10 | Other additives | Manufacturer to specify the data |
| 2.2.11 | 2-furfural and related Compounds content | Not detectable (<0.05 mg/kg) for each individual compound |
| **2.3** | **Performance** | |
| 2.3.1 | Oxidation stability, test duration 164 h | |
| 2.3.1.1 | Total acidity | 1.2 mg KOH/g, Max |
| 2.3.1.2 | Sludge | 0.8%, Max |
| 2.3.1.3 | DDF at $90^0$C | 0.5, Max |

| Sr No | Item description | Specification requirement |
|---|---|---|
| 2.3.2 | Gassing Tendency | Manufacturer to specify the data |
| 2.3.3 | ECT | Manufacturer to specify the data |
| **2.4** | **Health,safety and Environment** | |
| 2.4.1 | Flash point | $135^0$C, Min |
| 2.4.2 | PCA content Max | 3%, Max |
| 2.4.3 | PCB content | Not detectable (<2 mg/Kg) |

## Annexure D Manufacturing Quality Assurance Plan

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| **A** | **RAW Material** | | | | | | | | | | |
| 1 | **Winding Conductor (PICC)** | | | | | | | | | | |
| 1.1 | Bare Dimensions & Finish of Conductor | Major | Measurement | 1 sample per size per lot | IEC 13730 Part 27,IEC 60317,IS 7404,IS 6160,IS 613 | IEC 13730 Part 27,IEC 60317,IS 7404,IS 6160,IS 613 | Supplier's TC | P | V | R | |
| 1.2 | Increase in dimensions due to Paper covering | Major | Measurement | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.3 | Resistivity @ 20°C | Major | Electrical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.4 | No of Layers | Critical | Measurement | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.5 | Conductor Tensile strength | Critical | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.6 | Conductor Elongation | Critical | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.7 | % Overlap of Paper | Critical | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 1.8 | Corner Radius | Critical | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.9 | **Kraft Paper Insulation** | | | | | | | | | | |
| 1.9.1 | Thickness | Major | Measurement | 1 sample per size per lot | IEC:60554, IS:9335 | IEC:60554, IS:9335 | Supplier's TC | P | V | R | |
| 1.9.2 | Apparent Density | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.9.3 | Air Permeability | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.9.4 | Tensile Index (Longitudinal and Transverse) | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.9.5 | Electrical Strength in Air | Major | Electrical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.9.6 | Ash Content | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.9.7 | pH of 5% Aqueous Extract | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.9.8 | Conductivity of 5% Aqueous Extract | Critical | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.9.9 | Moisture Content | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.9.10 | Heat Stability | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.9.11 | Degree of Polymerization | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 1.9.12 | Elongation (MD & CMD) | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 1.9.13 | Tear index | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| **2.0** | **CRGO Laminations (Watt absorption)** | | | | | | | | | | |
| 2.1 | Specific Core Loss | Major | Electrical | Random | IEC 60404, IS 3024, IS 649 | IEC 60404, IS 3024, IS 649 | Supplier's TC | P | V | R | |
| 2.2 | Surface Insulation resistance | Major | Electrical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 2.3 | Ageing Test | Major | Measurement | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 2.4 | Stacking Factor | Major | Measurement | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 2.5 | Waviness | Major | Measurement | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 2.6 | Edge Burr | Major | Visual | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 2.7 | Sample testing for Checking Specific Core loss, accelerated ageing test, Surface insulation resistivity, AC permeability and magnetization, stacking | Major | Electrical | 100% | -DO- | -DO- | -- | -- | P | W | Sample will be randomly selected by BSES & will be send for testing at CPRI/ERDA |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| | factor, Ductility | | | | | | | | | | lab. |
| 3.12 | Core Cutting | Major | Visual | Random | -DO- | -DO- | -DO- | P | W | W | |
| **3.0** | **Un-impregnated Laminated Wood** | | | | | | | | | | |
| 3.1 | Thickness | Major | Visual | 1 sample size / LOT | IS 3513/IEC 61061 | IS 3513/IEC 61061 | Supplier's TC | P | V | R | |
| 3.2 | Density | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 3.3 | Moisture Content | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 3.4 | Oil Absorption | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 3.5 | Cross breaking strength | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 3.6 | Compressive Strength | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 3.7 | Electric Strength in Oil | Major | Electrical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 3.8 | Shrinkage in oil | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 3.9 | Tensile Strength,compressive strength | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| **4.0** | **Press Boards (Pre-compressed)** | | | | | | | | | | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 4.1 | Thickness | Major | Measurement | 1 sample/Size/LOT | IEC:60641, IS:1576 | IEC:60641, IS:1576 | Supplier's TC | P | V | R | |
| 4.2 | Tensile Strength (MD & CMD) | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 4.3 | Shrinkage in Air (MD & CMD) | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 4.4 | Moisture Content | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 4.5 | Oil Absorption | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 4.6 | Electrical Strength in Oil and air | Major | Electrical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 4.7 | pH of 5% aqueous extract | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 4.8 | Conductivity of 5% aqueous extract | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 4.9 | Compressibility | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 4.10 | Ash Content | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 4.11 | Apparent density | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 4.12 | Elongation (MD & CMD) | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| **5.0** | **Tank and its** | | | | | | | | | | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| | **accessories** | | | | | | | | | | |
| 5.1 | Structural steel | | | | | | | | | | |
| 5.1.1 | Thickness | Major | Measurement | Random | IS 2062/ IS:1576 | IS 2062/ IS:1576 | Suppliers TC | P | V | R | |
| 5.1.2 | Yield Strength | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 5.1.3 | Tensile Strength | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 5.1.4 | Elongation | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 5.1.5 | Bend test | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 5.1.6 | Chemical composition | Major | Chemical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| **5.2** | **Manufacturing of Tank and accessories** | | | | | | | | | | |
| 5.2.1 | Dimension check | Major | Measurement | 100% | MFR. Spec/ DRG/BSES approved document | MFR. Spec/ DRG/ BSES approved document | MFR. Fabrication report | P | W | R | |
| 5.2.2 | Joint preparation | Major | Measurement | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 5.2.3 | Assembly and alignment | Major | Visual and measurement | 100% | MFR. Spec/ DRG | MFR. Spec/ DRG | MFR. Fabrication report | P | V | R | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 5.2.4 | DP Test on Welds on Load bearing members eg. Jack Pads | Major | DP Test | 100% | -DO- | -DO- | -DO- | P | W | R | |
| 5.2.5 | Pressure test | Major | Mechanical | On One unit | CBIP | CBIP | Test Report | -- | P | W | **STAGE INSPECTION** |
| 5.2.6 | Vacuum test | Major | Mechanical | On One unit | CBIP | CBIP | Test Report | -- | P | W | **STAGE INSPECTION** |
| 5.2.7 | **Leakage test** | | | | | | | | | | |
| 5.2.7.1 | Main Unit | Major | Mechanical | 100% | MFR. STD | MFR. STD | Test report | P | W | R | |
| 5.2.7.2 | Conservator | Major | Mechanical | 100% | MFR. STD | MFR. STD | Test report | P | W | R | |
| 5.2.7.3 | Pipes | Major | Mechanical | 100% | MFR. STD | MFR. STD | Test report | P | W | R | |
| 5.2.8 | Surface preparation | Major | Visual | 100% | MFR. STD | MFR. STD | MFR. Fabrication report | P | V | R | |
| 5.2.9 | Final Paint Coat (including Primer), Thickness & Shade | Major | Measurement | 100% | MFR. STD | MFR. STD | Test report | P | V | R | |
| 5.2.10 | Paint Peel off test | Major | Visual | 100% | MFR. STD | MFR. STD | Test report | -- | P | R | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| **6.0** | **Bushing/Insulators** | | | | | | | | | | |
| 6.1 | Make and rating | Critical | Visual | 100% | IS 8603/IS 2099/App.Drg. | IS 8603/IS 2099/App.Drg. | Supplier's TC | P | V | R | |
| 6.2 | Visual inspection for surface smoothness, any damage, etc. | Critical | Visual | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 6.3 | Important dimension including Creepage distance | Major | Measurement | One sample /size / lot | -DO- | -DO- | -DO- | P | V | R/W | |
| 6.4 | Dry Power Frequency voltage withstabd test | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 6.5 | Air pressure test in water | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 6.6 | Electro -Tinning | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 6.7 | All routine electrical tests | Major | Electrical | -do- | -do- | -do- | -do- | P | V | R | |
| **7.0** | **Magnetic Oil Gauge** | | | | | | | | | | |
| 7.1 | Make and dimensions | Major | Physical | 100% | App.Drg./ Supplier Catalogue | App.Drg./ Supplier Catalogue | Supplier's TC | P | V | R | |
| 7.2 | Test for level (eg at 30° | Major | Mechanical | 100% | -DO- | -DO- | -DO- | P | V | R | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| | Max) | | | | | | | | | | |
| 7.3 | Switch contact test | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 7.4 | Leakage test | Major | Mechanical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 7.5 | Switch operating and setting | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 7.6 | Di-electric test at 2 KV AC between live terminal and body | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| **8.** | **Buchholz relay** | | | | | | | | | | |
| 8.1 | Make and type | Critical | Visual | 100% | App.Drg./ Supplier Catalogue /IS 3637 | App.Drg./ Supplier Catalogue /IS 3637 | Supplier's TC | P | V | R | |
| 8.2 | Bore size | Major | Measurement | One/size | -DO- | -DO- | -DO- | P | V | R | |
| 8.3 | Porosity and element test | Major | Critical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 8.4 | Gas volume and surge test | Major | Mechanical | One/Size | -DO- | -DO- | -DO- | P | V | R | |
| 8.5 | HV test at 2 KV AC & IR test | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | V | R | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 8.6 | Continuity for alarm/Trip | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| **9.0** | **Radiator** | | | | | | | | | | |
| 9.1 | Dimension, number of sections | Major | Measurement | 100% | MFR. DRG | VTD DRG | Supplier's TC | P | V | R | |
| 9.2 | Leakage Test with Air | Major | Visual | 100% | As per CBIP | As per CBIP | Supplier's TC | P | V | R | |
| 9.3 | Paint shade | Major | Visual & Measurement | Random | MFR. Specs /Drg | MFR. Specs /Drg | Supplier's TC | P | V | R | |
| 9.4 | Surface Preparation | Major | Measurement | 100% | SA 2.5 of ISO 8503/2 | SA 2.5 of ISO 8503/2 | Supplier's TC | P | V | R | |
| **10** | **Off Circuit Tap Changer** | | | | | | | | | | |
| 10.1 | Make, Rating and model | Major | Visual | 100% | MFR. Spec/ IS 8468 /IEC 214-1989 | MFR. Spec/ IS 8468 /IEC 214-1989 | Supplier's TC | P | V | R | |
| 10.2 | Contact Resistance test | Major | Visual | 100% | Supplier's STD | Supplier's STD | Supplier's TC | P | V | R | |
| 10.3 | Electrical Routine test | Major | Electrical | 100% | IS 8468/ IEC 214 | IS 8468/ IEC 214 | Supplier's TC | P | V | R | |
| 10.4 | Mechanical test on diverter switch including | Major | Mechanical | 100% | -DO- | -DO- | -DO- | P | V | R | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| | pressure test | | | | | | | | | | |
| 10.5 | HV test for Auxiliary circuit | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 10.6 | Mechanical test on Tap selector switch with motor drive | Major | Mechanical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 10.7 | Pressure test for Oil Compartment | Major | Mechanical test | 100% | -DO- | -DO- | -DO- | P | V | R | |
| **11.0** | **Transformer Oil** | Major | Testing | One Sample from each lot | Annexure D of BSES spec. | Annexure D of BSES spec. | STC | P | V | R | One sample of oil shall be drawn from **each lot of Transformer** offered for final inspection by BSES representative and same shall be tested at CPRI/ERDA |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| | | | | | | | | | | | lab as per relevant std. |
| **12.0** | **OTI / WTI Scanner** | | | | | | | | | | |
| 12.1 | Make and Model | Critical | Visual | 100% | MFR. STD/App. Drg. | MFR. STD/App. Drg. | Suppliers TC | P | P | R | |
| 12.2 | Calibration | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | P | R | |
| 12.3 | Check for alarm & trip signal operation against set value | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | P | R | |
| 12.4 | HV test | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 12.5 | Switch Setting | Major | Mechanical | 100% | -DO- | -DO- | -DO- | P | P | R | |
| **13.0** | **Bushing Metal parts** | | | | | | | | | | |
| 13.1 | Dimension Checks | Major | Mechanical | 100% | MFR. STD /IS 3347 | MFR. STD /IS 3347 | Supplier's TC | P | V | R | |
| 13.2 | Surface Finish | Major | Visual | 100% | -DO- | -DO- | -DO- | P | V | R | |
| **14.0** | **Current Transformers** | | | | | | | | | | |
| 14.1 | Dimensions, make | Major | Measurement | 100% | MFR. STD /App. DRG. / IS 2705 | MFR. STD /App. DRG. / IS 2705 | Supplier's TC | P | P | R | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 14.2 | Rating and terminal marking | Major | Physical | 100% | MFR. APPD. DRG | MFR. APPD. DRG | Supplier's TC | P | P | R | |
| 14.3 | Measurement of ratio and phase angle error | Major | Electrical | 100% | IS 2705 | IS 2705 | Supplier's TC | P | V | R | |
| 14.4 | High Voltage test | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 14.5 | Inter-Turn insulation test | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 14.6 | Polarity | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 14.7 | Knee point voltage | Major | Electrical | -do- | -do- | -do- | -do- | P | V | R | Only for Class-PS NCT |
| 14.8 | Excitation current | Major | Electrical | -do- | -do- | -do- | -do- | P | V | R | Only for Class-PS NCT |
| 14.9 | Secondary winding resistance | Major | Electrical | -do- | -do- | -do- | -do- | P | V | R | Only for Class-PS NCT |
| **15.0** | **Valves/ Butterfly valves** | | | | | | | | | | |
| 15.1 | Make & operation | Critical | Visual | 100% | APP.drg./MFR. STD/IS 778 | APP.drg./MFR. STD/IS 778 | Supplier's TC | P | P | R | |
| 15.2 | Leakage test for body | Major | Mechanical | 100% | -DO- | -DO- | -DO- | P | P | R | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 15.3 | Leakage test for top spindle | Major | Mechanical | 100% | -DO- | -DO- | -DO- | P | P | R | |
| 15.4 | Mounting dimensions | Major | Measurement | 100% | -DO- | -DO- | -DO- | P | P | R | |
| 15.5 | Material of Body & Seat | Major | Chemical & measurement | 1 sample per lot | -DO- | -DO- | -DO- | P | V | R | |
| **16.0** | **Pressure relief Valve/Device** | | | | | | | | | | |
| 16.1 | Make | Critical | Visual | 100% | MFR. STD/ App. Drg. | MFR. STD/ App. Drg. | -DO- | P | P | R | |
| 16.2 | Operating pressure | Major | Mechanical | 100% | -DO- | -DO- | -DO- | P | P | R | |
| 16.3 | Switch Contact test | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | P | R | |
| 16.4 | Mounting dimensions | Major | Measurement | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 16.5 | HV test between body & terminal | Major | Electrical | 100% | -DO- | -DO- | -DO- | P | V | R | |
| **17.0** | **Gasket** | | | | | | | | | | |
| 17.1 | Appearance & Finish | Major | Mechanical | 1 sample per size per lot | IS 4253-II, 1980/IS 3400 | IS 4253-II, 1980/IS 3400 | Supplier's TC | P | V | R | |
| 17.2 | Hardness, IRHD | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 17.3 | Tensile Strength | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 17.4 | Compressibility | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 17.5 | Compression set | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 17.6 | Flexibility | Major | Mechanical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| **18.0** | **Silica gel Breather with oil seal** | | | | | | | | | | |
| 18.1 | Type / model/weight | Major | Visual | 100% | MFR. STD /DRG | MFR. STD /DRG | Supplier's TC | P | V | R | |
| 18.2 | Color of Gel | Major | Visual | 100% | -DO- | -DO- | -DO- | P | V | R | |
| 19 | **Control cubicle/CT terminal Box** | | | | | | | | | | |
| 19.1 | Dimensions | Major | Measurement | 100% | BSES Approved document | BSES Approved document | Supplier's TC | P | V | R | |
| 19.2 | Hi-voltage test at 2kV RMS for one minute | Major | Electrical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 19.3 | Insulation resistance at 5000 V DC | Major | Electrical | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 19.4 | Verification of component & Fittings | Major | Visual | -DO- | -DO- | -DO- | -DO- | P | V | R | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 19.5 | Wiring check | Major | Visual | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| 19.6 | Welding, grinding, chipping | Major | Visual | --DO- | -DO- | -DO- | -DO- | P | V | R | |
| 19.7 | Paint | Major | Visual | -DO- | -DO- | -DO- | -DO- | P | V | R | |
| | | | | | | | | | | | |
| **B** | **In Process** | | | | | | | | | | |
| **1** | **Winding(LV and HV)** | | | | | | | | | | |
| 1.1 | Check for Visual, physical and dimensional Parameters and no. of parallel conductors. | | | | | | | | | | |
| 1.1.1 | Measurement of axial height, OD & ID& current density calculation. | Major | Measurement | 100% | MFR. Data/Drg/BSES approved document | MFR. Data/Drg/BSES approved document | QC report/Test report | -- | P | W | |
| 1.1.2 | Copper Conductor size (Bare & covered) | Major | Measurement | 100% | -DO- | -DO- | -DO- | -- | P | W | |
| 1.1.3 | No. of Turns / Disc | Major | Measurement | 100% | -DO- | -DO- | -DO- | -- | P | R | |
| 1.2 | Winding height | Major | Measurement | 100% | -DO- | -DO- | -DO- | -- | P | W | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 1.3 | Visual inspection of Brazed joints as applicable | Major | Visual | 100% | -DO- | -DO- | -DO- | -- | P | R | |
| 1.4 | Tap Leads termination in case of tap winding | Major | Visual | 100% | -DO- | -DO- | -DO- | -- | P | R | |
| 1.5 | Current density calculation | -- | -- | -- | -- | -- | -- | -- | P | W | |
| **1.6** | **Weight** | Major | Visual | 100% | -DO- | -DO- | -DO- | -- | P | W | |
| **2.0** | **Core Assembly** | | | | | | | | | | |
| 2.1 | Visual & Key Dimensional check | | | | | | | | | | |
| 2.1.1 | Diagonal distance | Major | Measurement | 100% | MFR.Drg/BSES approved document | MFR.Drg/BSES approved document | QC report/Test report | -- | P | W | |
| 2.1.2 | Window centre distance | Major | Measurement | 100% | -DO- | -DO- | -DO- | -- | P | W | |
| 2.1.3 | Window height | Major | Measurement | 100% | -DO- | -DO- | -DO- | -- | P | W | |
| 2.2 | Stack Thickness | Major | Measurement | 100% | -DO- | -DO- | -DO- | -- | P | W | |
| 2.3 | High Voltage test at 2 KV AC for I min between core & core clamp, Yoke | Major | Electrical | 100% | -DO- | -DO- | -DO- | -- | P | W | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| | bolt | | | | | | | | | | |
| 2.4 | Pre-Core loss measurement | Major | Electrical | 100% | -DO- | -DO- | -DO- | -- | P | W | |
| 2.5 | Weight | Major | Visual | 100% | -DO- | -DO- | -DO- | -- | P | W | |
| **3.0** | **Core-Coil Assembly** | | | | | | | | | | |
| 3.1 | Top & Bottom insulation arrangement | Major | Visual | 100% | MFR.Data /DRG/BSES approved document | MFR.Data /DRG/BSES approved document | QC report | -- | P | R | |
| 3.2 | Lead arrangement | Critical | Visual | 100% | -DO- | -DO- | -DO- | -- | P | R | |
| 3.3 | Tap & Lead End Brazing & Insulation | Critical | Visual | 100% | -DO- | -DO- | -DO- | -- | P | R | |
| 3.4 | Dimension of Coil After Shrinkage | Major | Measurement | 100% | -DO- | -DO- | -DO- | -- | P | R | |
| 3.5 | Verification of Major electrical clearances | Major | Visual & Measurement | 100% | -DO- | -DO- | -DO- | -- | P | R | |
| 3.6 | HV/LV Connection | Major | Visual | 100% | -DO- | -DO- | -DO- | -- | P | R | |
| 3.7 | Cleanliness | Major | Visual | 100% | -DO- | -DO- | -DO- | - | P | R | |
| **4.0** | **Core-Coil Assembly** | | | | | | | | | | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| | **Before Ovening** | | | | | | | | | | |
| 4.1 | Initial Ratio test | Major | Measurement | 100% | -DO- | -DO- | -DO- | -- | P | R | |
| **5.0** | **Core-coil assembly during drying** | | | | | | | | | | |
| **5.1** | Measurement & recording of temperature & drying time during vacuum treatment. | Major | Visual | 100% | MFR.Data /DRG | MFR.Data /DRG | QC report | -- | P | R | |
| **5.2** | Check for completeness of drying | Major | Visual | 100% | MFR.Data /DRG | MFR.Data /DRG | QC report | -- | P | R | |
| **5.3** | Certification of all test | Major | Visual | 100% | MFR.Data /DRG | MFR.Data /DRG | QC report | -- | P | R | |
| **6.0** | **Core-Coil Assembly After Ovening** | | | | | | | | | | |
| 6.1 | Ratio Test,Vector Group & Magnetic Balance test | Major | Electrical | 100% | -DO- | -DO- | QC report /Test report | -- | P | W | |
| 6.2 | Recording of time/Temp, Vacuum | Major | Measurement | 100% | -DO- | -DO- | -DO- | -- | P | R | |
| 6.3 | Record of Moisture extract | Major | Measurement | 100% | MFR. STD | MFR. STD | QC report | -- | P | R | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 6.4 | Verification of completeness & Drying | Major | Verify | 100% | MFR. STD | MFR. STD | QC report | -- | P | R | |
| 6.5 | Insulation resistance measurement by Megger | Major | Electrical | 100% | MFR. STD | MFR. STD | Test report | -- | P | R | |
| 6.6 | Earthing connection | Major | Visual | -DO- | MFR. STD | MFR. STD | QC Report | -- | P | R | |
| **7.0** | **Tanking** | | | | | | | | | | |
| 7.1 | Electrical clearance arrangement | Major | Measurement | 100% | MFR. DRG | MFR. DRG | QC report | -- | P | R | |
| 7.2 | Verification of Core-Frame Clamping arrangement | Major | Visual | 100% | -DO- | -DO- | -DO- | -- | P | R | |
| 7.3 | Core to frame insulation resistance test & HV test at 2 KV for min | Major | Electrical | 100% | -DO- | -DO- | -DO- | -- | P | R | |
| **8.0** | **Final Assembly for testing** | | | | | | | | | | |
| 8.1 | Fittings of external accessories | Major | Visual | 100% | MFR. STD /DRG | MFR. STD /DRG | Job Card | -- | P | R | |
| 8.2 | Internal Oil leakage test on main unit | Major | Visual | 100% | CBIP | CBIP | QC report | -- | P | R | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 8.3 | Oil filtration & pressure test | Major | Visual | -DO- | IS 1180 | IS 1180 | -DO- | - | P | R | |
| | | | | | | | | | | | |
| **C** | **Final testing** | | | | | | | | | | |
| **1** | **Routine Test** | | | | | | | | | | |
| 1.1 | Voltage Ratio test and check of phase displacement | Major | Electrical | 100% | IS 2026/IS 1180 | IS 2026/IS 1180 | Test Report | -- | P | W | |
| 1.2 | Winding Resistance at all tap corrected to 75°C | Major | Electrical | 100% | IS 2026/IS 1180 | IS 2026/IS 1180 | Test report | -- | P | W | |
| 1.3 | No Load Loss & Current @90%,100%&112.5% of rated voltage | Major | Electrical | 100% | IS 2026/IS 1180 | IS 2026/IS 1180 | Test report | -- | P | W | To be repeated after type test. |
| 1.4 | Impedance Voltage/Short Circuit Impedance(Principal Tap) | Major | Electrical | 100% | IS 2026/IS 1180 | IS 2026/IS 1180 | Test report | -- | P | W | |
| 1.5 | Load Loss measurement at 50% and 100% of load @Principal, Max, MinTap | Major | Electrical | 100% | IS 2026/IS 1180 | IS 2026/IS 1180 | Test report | -- | P | W | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 1.6 | Induced over voltage | Major | Electrical | 100% | IS 2026/IS 1180 | IS 2026/IS 1180 | Test report | -- | P | W | To be repeated after type test |
| 1.7 | Separate Source Voltage Test | Major | Electrical | 100% | IS 2026/IS 1180 | IS 2026/IS 1180 | Test report | -- | P | W | |
| 1.8 | Insulation Resistance &PI(10 min / 1 min) | Major | Electrical | 100% | -- | -- | Test report | -- | P | W | IR shall be more than 2000 MΩ<br>PI Shall be more than1.5 |
| 1.9 | Voltage Vector Relationship & Polarity | Major | Electrical | 100% | IS 2026/IS 1180 | IS 2026/IS 1180 | Test report | -- | P | W | |
| 1.10 | Magnetic Balance Test | Major | Electrical | 100% | IS 2026/IS 1180 | IS 2026/IS 1180 | Test report | -- | P | W | |
| 1.11 | Oil leakage test on transformer with complete fitting and accessories | Major | Visual | 100% | CBIP | CBIP | Test report | -- | P | W | |
| 1.12 | Polarity check & Ratio Test of LVWTI CT/ | Major | Electrical | 100% | IS 2026/IS 1180 | IS 2026/IS 1180 | Test report | -- | P | W | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| | Metering CT | | | | | | | | | | |
| 1.13 | BDV test on Transformer Oil | Major | Electrical | 100% | IS 2026/IS 1180 | IS 2026/IS 1180 | Test report | -- | P | W | |
| 1.14 | Power frequency withstand on auxiliary circuit | Major | Electrical | 100% | IS 2026/IS 1180 | IS 2026/IS 1180 | Test report | -- | P | W | |
| 1.15 | Heat Run Test (Temp. Rise Test) | Major | Testing | One Unit (each lot) | IS 2026/IS 1180 | IS 2026/IS 1180 | Test Report | -- | P | W | |
| 1.16 | Pressure relief device test | Major | Testing | One Unit (each lot) | MFR. STD | MFR. STD | Test Report | -- | P | W | |
| 1.17 | Visual and dimensional check | Major | Visual | 100% | Approved drawings | Approved drawings | Test Report | -- | P | W | |
| 1.18 | Measurement of Cap & tandelta of Wdg, Oil and HV bushing | Major | Electrical | One unit | -- | -- | Test report | -- | P | W | |
| 1.19 | | | | | | | | | | | |
| **2.0** | **Type test (One unit of each type and rating of Transformer at CPRI/ERDA)** | | | | | | | | | | |
| 2.1 | Heat Run Test (Temp. Rise Test) | Major | Testing | One Unit | IS 2026 | IS 2026 | Test Report | **CPRI/ERDA** | | | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 2.2 | Dynamic & Thermal (3 sec) Short Circuit Test | Major | Testing | One Unit | IS 2026 | IS 2026 | Test Report | **CPRI/ERDA** | | | |
| 2.3 | Impulse withstand Test on all HV & LV Limb for Chopped wave. | Major | Testing | One Unit | IS 2026 | IS 2026 | Test Report | **CPRI/ERDA** | | | |
| 2.4 | DGA Test Before & After temperature rise | Major | Testing | One Unit | Relevant std. | Relevant std. | Test Report | **CPRI/ERDA** | | | Test shall be conducted once per PO |
| **3.0** | **Special Test (One unit of each type and rating of Transformer)** | | | | | | | | | | |
| 3.1 | Zero Phase Sequence Test | Major | Testing | One Unit | IS 2026 | IS 2026 | Test Report | -- | P | W | |
| 3.2 | Noise Level Test | Major | Testing | One Unit | NEMA TR-1 | NEMA TR-1 | Test Report | -- | P | W | |
| 3.3 | No Load Harmonic Test | Major | Testing | One Unit | IS 2026 | IS 2026 | Test Report | -- | P | W | |
| 3.4 | HV Test on all auxiliary equipment and wiring after complete assembly | Major | Testing | One Unit | -- | -- | Test Report | -- | P | W | |
| **D** | **Dispatch & Packing** | | | | | | | | | | |
| 1.1 | Identification & packing | Major | Visual | 100% | As per packing list | As per packing list | Packing List | -- | P | -- | |

| SL NO | CHARACTRISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | M | O | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | 10 |
| 1.2 | Check for proper Packing | Major | Visual | 100% | As per packing list | As per packing list | Packing List | -- | P | -- | |
| 1.3 | Visual check before dispatch | Major | Visual | 100% | As per packing list | As per packing list | Packing List | -- | P | -- | |

**Note:**

- Transformer from each lot may be opened for core and winding verification. BSES approval is be taken prior to opening the transformer.
- Type Test shall be valid for 10 years.

All IS and IEC standards with their latest revisions/amendments shall be applicable

**LEGEND:**

S: Supplier
M: Main Contractor (Manufacturer)
O: Owner (BSES)

P - Perform
V - Verify
R – Review
W- Witness

**Schedule A Guaranteed Technical Particulars (Data by Seller)**

| Sr. | Particulars | Specified / Required | Offered |
|---|---|---|---|
| 1.0 | General | | |
| 1.1 | Make | | |
| 1.2 | Type | Oil immersed, core type, step down located generally outdoor but may be located indoor also with poor ventilation. Bidder shall confirm full rating available in indoor location also | |
| 2.0 | Nominal Continuous Rating, KVA | | |
| 2.1 | HV winding | 250/400/630/1000/1600/2000/2500kVA | |
| 2.2 | LV winding | 250/400/630/1000/1600/2000/2500kVA | |
| 3.0 | Rated voltage ( kV ) | | |
| 3.1 | HV Winding | 11 kV | |
| 3.2 | LV Winding | 415 volt | |
| 4.0 | Rated current ( Amps ) | 250/400/630/1000/1600/2000/2500kVA | |
| 4.1 | HV Winding | | |
| 4.2 | LV Winding | | |
| 5.0 | Connections | | |
| 5.1 | HV Winding | Delta | |
| 5.2 | LV Winding | Star with neutral | |
| 5.3 | Vector Group reference | Dyn11 | |
| | | | |
| 6.0 | Impedance at principal tap rated current and frequency, ohm @75 deg C | | |
| 6.1 | Impedance | 4.5%/4.5% / 4.5%/ 5.0/6.25/6.25 % with IS tolerance | |
| 6.2 | Reactance | | |
| 6.3 | Resistance | | |
| 6.4 | X/R ratio | | |
| 6.5 | Impedance at lowest tap at | | |

| | | | |
|---|---|---|---|
| | rated current and frequency | | |
| 6.6 | Impedance at highest tap at rated current and frequency | | |
| 7.0 | Resistance of the winding at $75^0$ C in ohm | | |
| 7.1 | a) HV | | |
| 7.2 | b) LV | | |
| 8.0 | Zero sequence impedance in ohm | | |
| 8.1 | a) HV | | |
| 8.2 | b) LV | | |
| 9.0 | Guaranteed maximum Total losses at principal tap at 75°C, kW | | |
| 9.1 | 50 % of Load | as per Spec Cl 3.25 | |
| 9.2 | 100% of Load | as per Spec Cl 3.26 | |
| 9.3 | No Load Loss (Max) | | |
| 9.4 | Total $I^2R$ losses of windings @ 75 deg C, KW | | |
| 9.5 | Total stray loses @ 75 deg C, KW | | |
| 9.6 | Total Load losses (Max.), KW | | |
| 9.7 | No load loss at maximum permissible voltage and frequency (approx.),kW | | |
| 10.0 | Temperature rise over reference ambient of 40 $^0$C | | |
| 10.1 | Top oil by thermometer $^0$ C | 40 $^0$C | |
| 10.2 | Winding by resistance$^0$ C | 45 $^0$C | |
| 11.0 | Efficiency | | |
| 11.1 | Efficiency at $75^0$C and unity power factor % | | |
| 11.1.1 | at 110% load | | |
| 11.1.2 | at 100% load | | |

| | | | |
|---|---|---|---|
| 11.1.3 | at 80% load | Not Less than 99.5% | |
| 11.1.4 | at 60% load | | |
| 11.1.5 | at 40% load | | |
| 11.1.6 | at 20% load | | |
| 11.2 | Efficiency at $75^0$C and 0.8 power factor lag % | | |
| 11.2.1 | at 110% load | | |
| 11.2.2 | at 100% load | | |
| 11.2.3 | at 80% load | | |
| 11.2.4 | at 60% load | | |
| 11.2.5 | at 40% load | | |
| 11.2.6 | at 20% load | | |
| 11.3 | Maximum efficiency at $75^0$C % | | |
| 11.4 | Load and power factor at which it occurs | | |
| 12.0 | Regulation , (%) | | |
| 12.1 | Regulation at full load at $75^0$ C | | |
| 12.1.1 | at unity power factor | | |
| 12.1.2 | at 0.8 power factor lagging | | |
| 12.2 | Regulation at 110% load at $75^0$ C | | |
| 12.2.1 | at unity power factor | | |
| 12.2.2 | at 0.8 power factor lagging | | |
| 13.0 | Tappings | | |
| 13.1 | Type | | |
| 13.2 | Capacity | | |
| 13.3 | Range-steps x % variation | | |
| 13.4 | Taps provided on HV winding (Yes / No) | | |
| 13.5 | Rated current of rotary switch | | |
| 14.0 | Cooling system | | |
| 14.1 | Type of cooling | ONAN | |

| | | | |
|---|---|---|---|
| 14.2 | No. of cooling unit Groups | | |
| 14.3 | Capacity of cooling units | | |
| 14.4 | Mounting of radiators | | |
| 14.5 | Number of Radiators | | |
| 14.8 | Total radiating surface , sqmm | | |
| 14.9 | Thickness of radiator tubes, mm | Minimum 1.2 mm | |
| 15.0 | Details of Tank | | |
| 15.1 | Material | Robust mild steel plate without pitting and low carbon content | |
| 15.2 | Thickness of sides mm | | |
| 15.3 | Thickness of bottom mm | | |
| 15.4 | Thickness of cover mm | | |
| 15.5 | Confirmation of Tank designed and tested for Vacuum, Pressure ( Ref: CBIP Manual ) , (Yes/ No) | | |
| 15.5.1 | Vacuum mm of Hg. / ($kN/m^2$) | As per IS | |
| 15.5.2 | Pressure mm of Hg. | | |
| 15.6 | Is the tank lid sloped? | Yes | |
| 15.7 | Inspection cover provided (Yes / No) | as per spec | |
| 15.8 | Location of inspection cover (Yes / No) | | |
| 15.9 | Min. dimensions of inspection cover ( provide list of all inspection cover with dimension), mm x mm | | |
| 16.0 | Core | | |
| 16.1 | Type: | Core | |
| 16.2 | Core material grade | Premium grade minimum M3 or better | |
| 16.3 | Core lamination thickness in | | |

| | | | |
|---|---|---|---|
| | mm | | |
| 16.4 | Insulation of lamination | With insulation coating on both sides | |
| 16.5 | Design flux density at rated condition at principal tap, Tesla | | |
| 16.6 | Maximum flux density at 12.5 % overexcitation /overfluxing, Tesla | 1.9 Tesla Max allowed | |
| 16.7 | Equivalent cross section area mm² | | |
| 16.8 | Guaranteed No Load current at 100% rated voltage , Amps | | |
| 16.8.1 | HV | | |
| 16.8.2 | LV | | |
| 16.9 | Guaranteed No Load current At 110% rated voltage, Amps | | |
| 16.9.1 | HV | | |
| 16.9.2 | LV | | |
| 17.0 | Type of Winding | | |
| 17.1 | HV | | |
| 17.2 | LV | | |
| 17.3 | Conductor material | Electrolytic Copper | |
| 17.4 | Current density (HV/LV) | Maximum allowed 3.0 A per sq mm at all taps | |
| 17.5 | Gauge/area of cross section of conductor | | |
| 17.5.1 | a) HV | | |
| 17.5.1 | b) LV | | |
| 17.6 | Insulating material | | |
| 17.6.1 | HV Turn | | |
| 17.6.2 | LV Turn | | |
| 17.6.3 | LV Core | | |
| 17.6.4 | HV - LV | | |
| 17.7 | Insulating material thickness, | | |

| | | | |
|---|---|---|---|
| | mm | | |
| 17.7.1 | HV Turn | | |
| 17.7.2 | LV Turn | - | |
| 17.7.3 | LV to Core | | |
| 17.7.4 | HV to LV | | |
| 18.0 | Minimum design clearance, mm | | |
| 18.1 | HV to earth in Air | | |
| 18.2 | HV to earth in oil | | |
| 18.3 | LV to earth in Air | | |
| 18.4 | LV to earth in oil | | |
| 18.5 | Between HV & LV in Air | | |
| 18.6 | Between HV & LV in oil | | |
| 18.7 | Top winding and yoke | | |
| 18.8 | Bottom winding and yoke | | |
| 19.0 | **Insulating oil** | | |
| 19.1 | Quantity of oil Ltrs | | |
| 19.1.1 | In the Transformer tank | | |
| 19.1.2 | In each radiator | | |
| 19.1.4 | Total quantity | | |
| 19.2 | 10% excess oil furnished? | Yes in separate non returnable drums with each transformer | |
| 19.3 | Type of Oil | As per cl 4.2.7 | |
| 20.0 | **Bushing / Support Insulator** | | |
| 20.1 | Make | - | |
| 20.2 | Type | | |
| 20.2.1 | HV side | As per Cl. 4.2.8.1 of the spec | |
| 20.2.2 | LV side | As per Cl. 4.2.8.2 of the spec | |
| 20.3 | Reference Standard | | |
| 20.4 | Voltage class, kV | | |
| 20.4.1 | HV side Bushing/ Support Insulator | 12 kV | |
| 20.4.2 | LV side line and neutral bushing/ Support Insulator | 1.1 kV | |

| | | | |
|---|---|---|---|
| 20.5 | Creepage factor for all bushing / Support Insulator mm/KV | 31 mm / kV | |
| 20.6 | Rated thermal short time current | | |
| 20.6.1 | HV bushing | 25 times rated current for 2 secs. | |
| 20.6.2 | LV line and neutral bushing | 25 times rated current for 2 secs. | |
| 20.7 | Weight, Kg | | |
| 20.7.1 | HV bushing | | |
| 20.7.2 | LV line and neutral bushing | | |
| 20.8 | Free space required for bushing removal, mm | | |
| 20.8.1 | HV bushing | | |
| 20.8.2 | LV line and neutral bushing | | |
| 21.0 | **Terminal connections** | | |
| 21.1 | HV | Cable size as per Cl no 3.28 | |
| 21.2 | LV | Cable size as per Cl no 3.30 | |
| 21.3 | LV Neutral | Cable size as per Cl no 3.30 | |
| | | | |
| 22.0 | **HV cable box** | Required | |
| 22.1 | Suitable for cable type,size | Cable size as per Cl no 3.28 | |
| 22.2 | Termination height | 750 mm min. | |
| 22.3 | Gland plate dimension, mm x mm | | |
| 22.4 | Gland plate Material | MS | |
| 22.5 | Gland plate thickness | 3 mm min. | |
| 22.6 | Phase to phase clearance inside box,mm | 180 mm | |
| 22.7 | Phase to earth inside box,mm | 120 mm | |
| 23.0 | **LV Cable box** | Required | |
| 23.1 | Suitable for cable type , size | Cable size as per Cl no 3.30 | |
| 23.2 | Termination height | 1000 mm, min. | |
| 23.3 | Gland plate dimension, mmxmm | | |

| | | | |
|---|---|---|---|
| 23.4 | Gland plate material | Aluminium | |
| 23.5 | Gland plate thickness | 5 mm min. | |
| 23.6 | Phase to phase | 25 mm | |
| 23.7 | Phase to earth | 25 mm | |
| 24.0 | L.V neutral Cable termination arrangement | Separate cable box not required (LV-N to be provided in LV cable box.) | |
| 25.0 | Current Transformer on LV phases | | |
| 25.1 | Type | | |
| 25.2 | Make | | |
| 25.3 | Reference Standard | | |
| 25.4 | CT Ratio | | |
| 25.5 | Burden, VA | | |
| 25.6 | Class of Accuracy | | |
| 25.7 | CT terminal box size | | |
| 26.0 | Pressure release device | | |
| 26.1 | Minimum pressure the device is set to rupture | | |
| 26.1.1 | For Main Tank | | |
| 26.1.2 | Alarm and trip contact ratings of protective devices | | |
| 27.0 | Fittings Accessories Each Transformer furnished as per Clause No 5. (Bidder shall attach separate sheet giving details, make and bill of materials) | | |
| 27.1 | OTI/WTI Scanner | | |
| 27.1.1 | Make | | |
| 27.1.2 | Model no | | |
| 27.1.3 | Auxiliary supply | | |
| 27.1.4 | Manual submitted (Yes/No) | | |
| 27.2 | Buchholz Relay | | |
| 27.2.1 | Make | | |

| | | | |
|---|---|---|---|
| 27.2.2 | Model no | | |
| 27.2.3 | Auxiliary supply | | |
| 27.2.4 | Manual submitted (Yes/No) | | |
| 27.3 | Auxiliary relays for Fault/indication identification (PRV, Buchholz relay, MOG) | | |
| 27.3.1 | Make | | |
| 27.3.2 | Model no | | |
| 27.3.3 | Auxiliary supply | | |
| 27.3.4 | Potential free contacts | | |
| 27.3.5 | Manual submitted (Yes/No) | | |
| 28.0 | Painting: as per clause for the transformer, cable boxes, radiator, Marshalling box (Yes/No) | | |
| 29.0 | Max over all transformer dimensions | As per Clause 3.32 | |
| 29.1 | Length, mm | | |
| 29.2 | Breadth, mm | | |
| 29.3 | Height, mm | | |
| 30.0 | Transformer Tank Dimensions | | |
| 30.1 | Length, mm | | |
| 30.2 | Breadth, mm | | |
| 30.3 | Height, mm | | |
| 31.0 | Weight data | | |
| 31.1 | Core, kG | | |
| 31.2 | Frame parts, kG | | |
| 31.3 | Core and frame, kG | | |
| 31.4 | Total Winding, kG | | |
| 31.5 | Core , Frame, Winding, kG | | |
| 31.6 | Tank, kG | | |
| 31.7 | Tank lid, kG | | |
| 31.8 | Empty conservator tank, kG | | |

| | | | |
|---|---|---|---|
| 31.9 | Each radiator empty, kG | | |
| 31.10 | Total weight of all radiators empty, kG | | |
| 31.11 | Weight of oil in Tank, kG | | |
| 31.12 | Weight of oil in Conservator, kG | | |
| 41.13 | Weight of oil in each Radiators, kG | | |
| 31.14 | Total weight of oil in Radiators, kG | | |
| 31.16 | Total Transport weight of the transformer, kG | | |
| 32.0 | Volume Data | | |
| 32.1 | Volume of oil in main tank, litres | | |
| 32.2 | Volume of oil between highest and lowest levels of main conservator, litres | | |
| 32.4 | Volume of oil in each radiator, litres | | |
| 32.5 | Total volume of oil in radiators, litres | | |
| 32.7 | Transformer total oil volume, litres | | |
| 33.0 | Shipping Data | | |
| 33.1 | Weight of heaviest package, kG | | |
| 33.2 | Dimensions of the largest package (L x B x H) mm | | |
| 34.3 | Tests | | |
| 34.1 | All in process tests confirmed as per Cl. (Yes/ No) | | |
| 34.2 | All Type Tests confirmed as per Cl. (Yes / No) | | |

| | | | |
|---|---|---|---|
| 34.3 | All Routine Tests confirmed as per Cl. (Yes/ No) | | |
| 34.4 | All Special Tests confirmed as per Cl. (Yes/ No) | | |

**Schedule B Guaranteed Technical Particulars of Transformer Oil**

Bidder to submit hard copy duly filled & signed along with techno commercial offer.
Bidder to submit separate GTP for each type of insulating oil –

| Sr No | Item description | Specification requirement | Data by Vendor |
|---|---|---|---|
| 1.0 | Manufacturer Name | | |
| 1.1 | | Address | |
| 1.2 | | Contact person | |
| 1.3 | | Contact telephone no | |
| **2.0** | **Function** | | |
| 2.1 | Viscosity | | |
| 2.1.1 | Viscosity at $40^0$C | 15 $mm^2$/s, Max | |
| 2.1.2 | Viscosity at $0^0$C | 1800 $mm^2$/s, Max | |
| 2.2 | Pour Point | - $10^0$C, Max | |
| 2.3 | Water content | 30 mg/Kg, Max | |
| 2.4 | Breakdown voltage | | |

| Sr No | Item description | Specification requirement | Data by Vendor |
|---|---|---|---|
| 2.4.1 | New unfiltered oil | 30 kV, Min | |
| 2.4.2 | After filtration | 70 kV, Min | |
| 2.5 | Density at $20^0$C | 0.895 g/ml, Max | |
| 2.6 | Dielectric dissipation factor at $90^0$C | 0.005, Max | |
| 2.7 | Particle Content | Manufacturer to specify the data | |
| **3.0** | **Refining/Stability** | | |
| 3.1 | Appearance of oil | Clear, free from sediment and suspended matter | |
| 3.2 | Acidity | 0.01 mg KOH/g, Max | |
| 3.3 | Interfacial tension at $27^0$C | 0.04 N/m, Min | |
| 3.4 | Total sulphur content | Manufacturer to specify the data | |
| 3.5 | Corrosive sulfur | Not-corrosive | |
| 3.6 | Potentially Corrosive sulfur | Not-corrosive | |
| 3.7 | DBDS | Not detectable (<5 mg/kg) | |
| 3.8 | Inhibitor | Not detectable (<0.01%) | |
| 3.9 | Metal Passivator | Not detectable (<5 mg/kg) | |
| 3.10 | Other additives | Manufacturer to specify the data | |
| 3.11 | 2-furfural and related Compounds content | Not detectable (<0.05 mg/kg) for each individual compound | |
| **4.0** | **Performance** | | |
| 4.1 | Oxidation stability, test duration 164 h | | |
| 4.1.1 | Total acidity | 1.2 mg KOH/g, Max | |
| 4.1.2 | Sludge | 0.8%, Max | |
| 4.1.3 | DDF at $90^0$C | 0.5, Max | |
| 4.2 | Gassing Tendency | Manufacturer to specify the data | |
| 4.3 | ECT | Manufacturer to specify the data | |
| **5.0** | **Health,safety and Environment** | | |
| 5.1 | Flash point | $135^0$C, Min | |
| 5.2 | PCA content Max | 3%, Max | |
| 5.3 | PCB content | Not detectable (<2 mg/Kg) | |

## Schedule C Recommended Spares (Data by Seller)

List of recommended spares as following –

| Sr No | Description of spare part | Unit | Quantity |
| --- | --- | --- | --- |
| | | | |
| 1 | | No | |
| 2 | | No | |
| 3 | | No | |
| 4 | | No | |

| | | | |
|---|---|---|---|
| 5 | | No | |
| 6 | | No | |
| | | | |

**Date: 04.04.2025**

# Clarification against Technical Specification No: BSES-TS-12-TRDU-R1

| | **In addition to the BSES technical specification following points to be complied by Bidder:** |
|---|---|
| 1 | Age of CRGO shall not be more than 2 year old from the date of award of P.O. |
| 2 | During execution of P.O., in any lot, if vendor offering any alternate make and grade of CRGO from approved make list which differ in make of CRGO, which they supplied in earlier lot, same shall be treated as new make of CRGO and complete test shall be conducted at CPRI/ERDA by the vendor without any cost implications to BSES |
| 3 | Supply of 10% extra transformer oil- Bidder need not to supply the same, clause waived off. |
| 4 | Connection for DT meter to be tapped from LT main bus bar, same to be done through tinned copper thimbles. |
| 5 | There should be no joint across breather pipe, it shall be fabricated using single piece of pipe |
| 6 | i. To participate in the tender, offered product of same or higher ratings of distribution transformer must be type tested (including special test) from CPRI/ERDA.<br>Validity of the type test shall be considered for 5 years for Non-BSES design & 10 years for type tested product with BSES design from the date of bid opening subject to no design changes of type tested offered product<br>ii. In case of bidder participated with higher rated type tested (including special test) distribution transformer and PO awarded by BSES, bidder has to conduct type test (including special test) from CPRI/ERDA after preparation of 1st sample transformer. BSES shall seal the transformer for type testing and may witness the tests if required (for test details please refer clause no 9.4 and 9.5 of the technical specification).<br>iii. Bulk manufacturing clearance shall be given after successful completion of type tests from CPRI/ERDA |
| 7 | If one minute IR value is above 5000 M-ohms and it is not be possible to obtain an accurate 10 minutes reading, in such cases polarization index can be disregarded as a measure of winding condition.-Clause Removed from technical specification |
| 8 | Temperature Rise Test shall be conducted on each rating of transformer in in-house testing laboratory. Test shall be conducted once per purchase order. |
| 9 | Dissolved Gas Analysis (DGA) before and after temperature rise test on each rating of transformer shall be conducted from CPRI/ERDA.Test shall be conducted once per purchase order. |
| 10 | Additional neutral bus bar<br>1. Size and type shall be same as per the main neutral busbar<br>2. Busbar shall be tapped from the main neutral bus bar using nut, bolts and support |

| | |
|---|---|
| | insulator inside the LV cable box and same shall be extended upto 200 mm (minimum) below the gland plate |
| 11 | Oil testing- Oil sample shall be sealed from Transformer after completion of final inspection.<br>Complete oil Testing shall be conducted as per table 3 of IS 1866:2017 (or any latest IS) at CPRI/ERDA. Test shall be conducted Once per lot.<br><br>Note:<br>Testing facilities of two tests (DBDS & Corrosive Sulphur content) is available at CPRI Bangalore only & mandatory. |
| 12 | Latest amendment of all national and international standards mentioned in the technical specification shall be applicable. |
| 13 | Nut bolt arrangement at every joint shall include 2 Nos plain washers and 1 No. spring washer on all the Transformers before dispatch. |

**Special Note: In the event of new DTs delivered at BSES store & found defective:**

| Sl no | Type of defect in major categories | Action | | Location | | Responsibility | | Required Tests/Checks | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | | Repairing | Replacement | OEM Works | BSES Store | OEM | BSES | | |
| 1 | Oil leakage from radiator | X | √ | √ | X | √ | X | • Pressure test<br>• Oil Breakdown Voltage test (BDV)<br>• Insulation Resistance test (IR) | Welding/M-seal/Putty etc. shall not be allowed |
| 2 | Oil leakage from tank top cover/ Conservator | √ | √ | √ | √ | √ | X | • Pressure test<br>• Oil Breakdown Voltage test (BDV)<br>• Insulation Resistance test (IR) | Welding/M-seal/Putty etc shall not be allowed |

| Sl no | Type of defect in major categories | Action | | Location | | Responsibility | | Required Tests/Checks | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | | Repairing | Replace ment | OEM Works | BSES Store | OEM | BSES | | |
| 3 | Oil leakage from Tank body | √ | √ | √ | √ | √ | X | • Pressure test<br>• Oil Breakdown Voltage test (BDV)<br>• Insulation Resistance test (IR) | M-seal/Putty etc. shall not be allowed |
| 4 | Incomplete/ Damaged accessories | X | √ | X | √ | √ | X | Routine Test Certificates (RTC) of replaced accessories required | |
| 5 | Low Oil level in tank | √ | X | X | √ | √ | X | • Pressure test<br>• Oil Breakdown Voltage test (BDV)<br>• Insulation Resistance test (IR) | |
| 6 | Dent on Tank body (Minor) | √ | √ | √ | √ | √ | X | • Magnetic Balance test<br>• Ratio Test<br>• Insulation Resistance test (IR)<br>• No load test ( LT Side supply) | |
| | Dent on Tank body (Major) | X | √ | √ | X | √ | X | • Complete replacement of the tank<br>• Complete test (Routine & acceptance) shall be conducted in | |

| Sl no | Type of defect in major categories | Action | | Location | | Responsibility | | Required Tests/Checks | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | | Repairing | Replacement | OEM Works | BSES Store | OEM | BSES | | |
| | | | | | | | | accordance with Tech. Specification | |
| 7 | Wiring/ Connection | √ | X | X | √ | √ | X | • Functionality test<br>• High Voltage withstand test (2kV) | |
| 8 | Others | --- | | | | | | BSES decision shall be final | |