Volume – I

Tender Notification for

RATE CONTRACT FOR THE PROCUREMENT OF VARIOUS RATINGS OF OIL TYPE DISTRIBUTION TRANSFORMERS UPTO 100 KVA IN BRPL

CMC/BR/26-27/FK/PR/RJ/1371

Due Date for Submission of Bids: 01.08.2026

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/26-27/FK/PR/RJ/1371

RATE CONTRACT FOR THE PROCUREMENT OF VARIOUS RATINGS OF OIL TYPE DISTRIBUTION TRANSFORMERS UPTO 100 KVA IN BRPL

BSES
RAJDHANI POWER LIMITED

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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 UPTO 100 KVA IN BRPL, TENDER NOTICE CMC/BR/26-27/FK/PR/RJ/1371 DUE FOR SUBMISSION ON DT. 01.08.2026"**.

Sl. No.	Item Description	Specification	Requirement	Estimated Cost
			Total Qty.	
BRPL, DELHI				
1	Various Ratings of Oil Type Distribution Transformer up to 100 kVA in BRPL	SECTION V	455 Nos.	Rs. 8.70 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 **11.07.2026** onwards on all working days up to **01.08.2026**. 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/26-27/FK/PR/RJ/1371, 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. 01.08.2026** as indicated earlier and will be opened at the address mentioned above dt. **01.08.2026 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. 8,70,000 /-** 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) **For 25 kVA, 50 kVA & 63 kVA DT**: The Bidder should have supplied at least 100 nos. of transformers of 25 kVA rating or higher ratings 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.

For 100 kVA DT: Bidders Quoting for 100 kVA shall furnish the supply details of 30 nos. of 100 kVA rating or higher ratings 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) **For 25 kVA, 50 kVA & 63 kVA DT:** Performance certificate for minimum 2 year satisfactory performance for 25 kVA or higher ratings supplied in last 7 years from the date of bid opening from at least two utilities/ SEB's/ PSU's/ reputed company wherein the end user shall be utilities/ SEB's/ PSU's.

For 100 kVA DT: Performance certificate for minimum 2 year satisfactory performance for 100 kVA or higher ratings supplied in last 7 years from the date of bid opening from at

least two utilities/ SEB's/ PSU's/ reputed company wherein the end user shall be utilities/ 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 plant installed capacity to supply of minimum 10 nos DT 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 10 Crores or more in last three (3) Financial Years - *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 30.07.2026 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.	01.08.2026, 1500 Hrs
3	Commercial Offer	Prices for Distribution Transformer and Break up regarding basic price and taxes. Delivery commitment	01.08.2026, 1500 Hrs
4	Opening of technical bid	As per RFQ	01.08.2026, 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@reliancegroupindia.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/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 RC 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.

8.0 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. Anupam Kumar Copy to Ms. Deepti Sharma	Mr. Satyam Singh Copy to Mr. Pankaj Goyal & Ms. Rachna Jain
Address	CES Deptt., 1st floor, B-Block, BSES Rajhdhani Power Limited, BSES Bhawan, 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	anupam.o.kumar@reliancegroupindia.com deepti.r.sharma@reliancegroupindia.com	satyam.singh@reliancegroupindia.com rachna.jain@reliancegroupindia.com pankaj.goyal@reliancegroupindia.com

SECTION – II

INSTRUCTION TO BIDDERS (ITB)

RATE CONTRACT FOR THE SUPPLY OF VARIOUS RATINGS OF OIL TYPE DISTRIBUTION TRANSFORMER UPTO 100 KVA IN BRPL

CMC/BR/26-27/FK/PR/RJ/1371

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 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. 8,70,000/-**. 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 2026, the applicable prices should be those prevailing as on 1st April, 2026.

If the date of delivery in terms of clause given below falls in November 2026, the applicable prices of raw material should be as published by IEEMA prevailing as on 1st October, 2026.

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 submitted by the bidder not later than **1500 HRS on 01.08.2026** on SRM portal.

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 UPTO 100 KVA IN BRPL

CMC/BR/26-27/FK/PR/RJ/1371

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 60 months from the date of commissioning or 66 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.

SECTION – IV: QUANTITY AND DELIVERY REQUIREMENT

Sl. No.	Item Description	Specification	Requirement	Delivery Schedule	Location
1	25 kVA Single Phase DT	SECTION V	400 nos.	Within 02 months from the date of drawing approval received	BRPL Stores in New Delhi
2	25 kVA Three Phase DT		18 nos.		
3	63 kVA Three Phase DT		4 nos.		
4	100 kVA Three Phase DT		33 nos.		
TOTAL			455 nos.		

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 "Various ratings of Oil Type Distribution Transformer up to 100 kVA" 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/26-27/FK/PR/RJ/1371

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)
25 kVA Single Phase DT	400	Nos										
25 kVA Three Phase DT	18	Nos										
63 kVA Three Phase DT	4	Nos										
100 kVA Three Phase DT	33	Nos										

Note:
1. Prices shall be Variable
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. If there is a discrepancy between the uploaded price as per price format (Annexure III) & price quoted in SRM portal, quoted price as per price format (Annexure III) shall prevail

Bidders seal & signature

Annexure – IV

Enquiry No. : CMC/BR/26-27/FK/PR/RJ/1371

COMMERCIAL TERMS AND CONDITIONS

S.NO.	TERMS	DESCRIPTION	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 up to Delhi stores. Unloading at stores shall 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	Within 02 months from the date of approval of drawings.	
5	Defect Liability Period	60 months after commissioning or 66 months from the last date of supply, 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. 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/26-27/FK/PR/RJ/1371

NO DEVIATION SHEET

SL NO	SL NO OF TECHNICAL SPECIFICATION	DEVIATION, IF ANY

SIGNATURE & SEAL OF BIDDER

NAME OF BIDDER

CHECK LIST

SN	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	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

Annexure VII

QUALIFYING CRITERIA COMPLIANCE INDEX - TECHNICAL CRITERIA				
SN	Qualifying Criteria Description	Documentary Proof Description	Documentary Proof Enclosed on Bid Page No.	
			From	To

Annexure VIII

LIST OF PURCHASE ORDERS EXECUTED & DELIVERY DETAILS IN SUPPORT OF QUALIFYING REQUIREMENTS													
SN	Item Details				PO & Execution Details					Customer Name	End User (shall be Utility/ SEB's/ PSU's) name and details	PO copy, MDCC /Delivery completion certificates/ Invoice Copies enclosed on Bid Page no.	
	Item	Model	Voltage Rating (kV)	Current Rating (A)	PO No.	PO Date	PO Qty	Executed Qty	Execution Year			From	To
Total							Σ	Σ					

RAJDHANI POWER LIMITED

Annexure IX

LIST OF PERFORMANCE CERTIFICATES IN SUPPORT OF QUALIFYING REQUIREMENT														
SN	Item Details				PO no.	Supplied/ Commissioning		Performance Certificate Issue Date	Performance Certificate Issued By End User (Utility/ SEB/ Govt Org.)	Contact Details of Issuing Person			Enclosed on Bid Page No.	
	Item	Model	Voltage Rating (kV)	Current Rating (A)		Qty	Date			Name	Email	Mobile	From	To
Total						Σ								

BSES
RAJDHANI POWER LIMITED

SECTION – V

TECHNICAL SPECIFICATIONS (TS)

Various Ratings of Oil Type Distribution Transformer up to 100 kVA

CMC/BR/26-27/FK/PR/RJ/1371

The detailed technical specifications of Distribution Transformer

BSES

Specification of

Single Phase Oil Filled CSP Transformer

Specification no – BSES-TS-30-SPT-R0

Revision		0
Date		22/04/2022
Pages		36
Prepared by	Jeena Borana	
	Vani Sood	22/04/22
Reviewed by	Srinivas Gopu	
	Amit Tomar	22/04/2022
Approved by	Gaurav Sharma	
	Gopal Nariya	

INDEX

Record of Revision

Sl No.	Revision No	Item/Clause No.	Nature of change	Approved by

1. Scope of work

1.1 This specification covers design, engineering, manufacture, assembly, testing at manufacture's works, packing, transportation and delivery to site, supervision of erection, testing at site & commissioning and submission of complete documentation of CSP transformers to be used in HVDS system.

1.2 The transformer shall be complete with all components and accessories, which are necessary or usual for their efficient performance and trouble free operation under the various operating and atmospheric conditions specified in annexure A.

1.3 Such of the parts that may have not been specifically included, but otherwise form part of the transformer as per standard trade and/or professional practice and/or are necessary for proper operation of transformer, will be deemed to be also included in this specification.

2. Codes & standards

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

2.2 Vendor shall possess valid BIS Certification.

IS 1180 part 1	Outdoor type oil immersed distribution transformer upto and including 2.5MVA,33kV
IS 1180 part 3	Outdoor type oil immersed distribution transformer upto and including 2.5MVA, 33kV. Part 3 Natural/Synthetic Organic Ester oil Liquid Immersed.
IS 2026	Power Transformers
IS 2026-4	Terminal Marking, tappings and Connections for Power Transformers.
IS:3347	Dimensions for Porcelain Transformer bushing
IS 16659	Fluids for Electro technical Application- Unused Natural Esters for Transformers and Similar Electrical Equipment
IS-12444	Specification for Cu Wire rods
IS-5484	Specification for Al Wire rods
IS:10028	Code of practice for selection, installation & maintenance of transformers
IS 5561	Electrical Power Connectors
IS 5	Colors for ready mix paints
IS/IEC 60071	Co-ordination of Insulation.
IEC 62770	Unused natural esters for transformers and similar electrical

	equipment
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 60445	Basic& Safety principles for man-machine interface, marking and identification, Identification of Equipment Terminals and conductor terminals
IEEE C57.155	IEEE Guide for interpretation of Gases Generated in Natural Ester and Synthetic Ester-Immersed Transformer
DIN 42531 to 33	Specification for Outdoor Bushings
ASTM B-49	Specification for Cu Wire rods
ASTM B-233	Specification for Al Wire rods
	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

v Other documents

3. 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 A
3.5	Location of equipment	Outdoor application
3.6	Reference design ambient temperature	50 deg C
3.7	Type of transformer	Sealed type, completely self protected (CSP)
3.8	Type of construction	Core type, oil immersed
3.9	Type of cooling	Oil natural air natural (KNAN)
3.10	No of phases	Single phase on primary & secondary side
3.11	No of windings	Two (one each for primary & secondary)
3.12	Rated frequency (Hz)	50 Hz
3.13	Highest system voltage HV side	12kV
3.14	Lightning Impulse withstand voltage, kV peak	
3.14.1	For nominal system voltage of 11 kV	75
3.15	Power Frequency Withstand Voltage kV rms	
3.15.1	For nominal system voltage of HV	28
3.15.2	For nominal system voltage of LV	3
3.16	Thermal and Dynamic short circuit withstand	For 3 secs.
3.17	Method of 11kv system earthing	Effectively earthed at 11kv source
3.18	Rated voltage HV Phase to Neutral	$11/\sqrt{3}$ KV
3.19	Rated voltage LV	240V
3.20	Rated HV current	
3.20.1	16kVA	2.52A
3.20.2	25kVA	3.96A
3.20.3	50kVA	7.87A
3.21	Rated LV current	
3.21.1	16kVA	66A
3.21.2	25kVA	104A
3.21.3	50kVA	208A
3.22	Percentage Impedance at 75 deg C	4% with IS tolerance
3.23	Max Total losses(No Load+ Load Losses at 75^0C) at 50% of the rated load , Watts	

3.23.1	16 kVA	82
3.23.2	25 kVA	110
3.23.3	50 kVA	210
3.24	Max Total losses (No Load+ Load Losses at 75^0C) at 100% of the rated load , Watts	
3.24.1	16 kVA	224
3.24.2	25 kVA	300
3.24.3	50 kVA	590
3.25	Temperature rise over reference ambient of 50^0C	
3.25.1	Top oil by thermometer 0 C	40^0 C
3.25.2	Winding by resistance 0 C	45^0 C
3.26	Reference standard	IS 1180 part 3/IS 1180 part 1
3.27	Overload Capability	As per IS 2026-part 7
3.28	Noise Level	As per IEC 60076-10
3.29	Minimum terminal clearance	
3.29.1	HV phase to earth	140 mm
3.29.2	LV phase to earth	40 mm

4. Construction & Design

4.1	**Type**	Double Copper wound, single phase, oil immersed with KNAN cooling with completely self protected (CSP)
4.2	**Major Parts**	
4.2.1	**Tank**	
4.2.1.1	Type	Sealed type with bolted cover which seals the interior of the tank from atmosphere.
4.2.1.2	Material of Construction	Tank should be round and made of good quality sheet steel
4.2.1.3	Tank Thickness	Adequate for meeting the requirements of pressure and vacuum type tests as per IS 1180 (Part – 3/Part-1) It shall be stiffed to provide sturdy and robust construction to withstand extreme pressure conditions.

4.2.1.4	Tank features	i) The circular base plate edges of the tank shall be folded upward for at least 25 mm, to have sufficient overlap with vertical sidewall of the transformer. ii) All seams and joints shall be double welded iii) The tank should be capable of withstanding pressure and vacuum as per values specified in IS: 1180 (Part – 3/Part-1) iv) The tank cover shall have plasticized surface at the top to guard against birdage faults. Alternatively, suitable insulating shrouds shall be provided on the bushing terminals. v) The transformer shall have a self pressure venting system. vi) Steel surface of the tank shall be prepared by sand blast or chemical cleaning including phosphating as per IS: 3618. vii) The space on the top of oil shall be filled with dry air or nitrogen. The nitrogen plus oil volume inside the tank shall be such that even under extreme operating conditions, the pressure generated inside the tank does not exceed 0.4 Kg/cm2 positive or negative. viii) Heat resistance paint (Hot oil proof) shall be provided inside the tank. On external surface one coat of Thermo setting powder paint or two coats of zinc chromate followed by two coats of synthetic enamel paint of shade conforming to No.631 of IS:-5 shall be provided. The overall thickness of the paint shall be minimum150 micron.
4.2.2	**Core**	

4.2.2.1	Material	High grade , non ageing, low loss, high permeability, grain oriented, cold rolled silicon steel lamination
4.2.2.2	Grade	Premium Grade minimum M3 or better
4.2.2.3	Lamination thickness	0.23 mm Max.
4.2.2.5	Maximum Flux Density at 12.5 % over excitation / over fluxing	1.9 T
4.2.26	No load current	2% and 4% of RFLC at 100% and 112.5% Max
4.2.3	**Winding**	
4.2.3.1	Material	Electrolytic Copper
4.2.3.2	Winding connection	
4.2.3.2.1	HV Winding	Both ends of the primary winding shall be brought out through an appropriate HV bushings, one end of HV winding shall be externally earthed.
4.2.3.2.2	LV Winding	The secondary winding shall be connected to two LV bushing
4.2.3.3	Maximum Current Density allowed	3 Amp per sq mm
4.2.3.4	Winding Insulation	DPC insulation shall be used for HV and LV winding wires and electrical grade plain insulation Kraft paper for interleaving, no material, which can be affected by the action of oil under the operating conditions of the transformers, shall be used in the transformers or leads of the bushings.
4.2.3.5	Design features	i) The core and coil assembly shall be securely held in position to avoid any movement under short-circuit conditions. ii) All turns of windings shall be adequately supported to prevent movement, in cases where turns are spaced out, a suitable inter-turn packing shall be provided. iii) The type of winding provided for HV side shall be preferably disc type or spiral winding. iv) The type of winding for LV side shall be preferably cylindrical, layer
4.2.4	**Transformer Oil**	
4.2.4.1	Type	i) Natural Organic Ester oil should be

		in accordance with specification as per Annex B of this document. ii) One sample of oil drawn from every lot of transformer offered for inspection should be tested at CPRI/ERDA for tests as listed in IS16659. The cost of this testing should be included within the cost of transformer.
4.2.5	**Bushings and Terminations**	
4.2.5.1	Type of HV side bushing	Outdoor, Porcelain clad, creepage as per 31mm/kV(min)with voltage class of 12kV
4.2.5.1.1	Essential provision for HV side line bushing	HV bushings shall be fitted with molded heat shrinkage insulating covers / shrouds suitable for Aerial Bunched Conductor to provide protection of the bushing palm.
4.2.5.2	Type of LV side bushing	Outdoor, Porcelain clad, creepage as per 31mm/kV(min) with voltage class of 1.1kV.
4.2.5.3	Arcing Horns	Not required
4.2.5.4	Termination on HV side bushing	i) The bushing palm is suitable for termination of 1CX 150 sqmm Aerial bunched cables, with bolted type clamping arrangement both in horizontal and vertical directions. ii) In case of copper/copper alloy stems, suitable bimetallic clamps with bolted type arrangement described above shall be used.
4.2.5.5	Termination of LV side bushing	Suitable for termination of 2 runs of 1CX95 sq mm XLPE cable.
4.2.5.6	Continuous Current rating	Minimum 20 % higher than the rated current of the transformer
4.2.5.7	Rated thermal short time current	25 times the rated current for 2 sec

4.2.6	**LT cable box**	i) The LT cable box shall be provided as an integral part of the transformer designed for outdoor duty with minimum IP-55 protection. ii) MCCB is to be provided after LT bushing in the LT cable box iii) The cable box shall be equipped with LED to indicate ON/OFF& tripping of LT MCCB. On resetting of LTMCCB the tripping LED shall be automatically switched off. iv) LT bushing shall be inside the distribution box and a facility for sufficient outgoing feeders through cable glands shall be provided.
4.2.7	**Lightning Arrestor**	
4.2.7.1	Type	Non linear resistance type
4.2.7.2	Rated Voltage of Arrestor, kV rms	9
4.2.7.3	Nominal Discharge Current, kA peak	5
4.2.7.4	Mounting arrangement	i) Lightning arrestor shall be mounted external to the transformer and shall be suitable for outdoor type duty. ii) The line terminal of the surge arrestor shall be connected the HV bushing and the earth terminal of the surge arrestor shall be solidly connected to a separate earth externally.
4.2.8	**Transformer Mounting Arrangement**	The transformers are to be mounted on single pole MS – I channel or tubular pole or PCC pole, the transformer therefore shall be provided with suitable and robust mounting arrangement. The mounting arrangement drawing shall be furnished for approval.
4.2.9	**Hardware**	
4.2.9.1	External	Stainless Steel
4.2.9.2	Internal	Cadmium plated except special hardware for frame parts and core assembly as per manufacturer's design
4.2.10	**Gasket**	i) Gaskets shall be made of synthetic rubber or synthetic rubberized cork resistant to hot transformer ester

		liquid. ii) Gasket shall confirm to Type III as per IS 11149/Type C as per IS 4253 (Part 2) and shall be compatible with high contact temperature i.e thermal class of 130^0C.
4.2.11	**Painting of transformer**	
4.2.11.1	Surface preparation	By 7 tank pretreatment process or shot blasting method
4.2.11.2	Finish on internal surfaces of the transformer	Heat resistant and oil resistant paint two coats. Paint shall neither react nor dissolve in hot transformer insulating oil.
4.2.11.3	Finish on outer surface of the transformer	Battle ship grey shade 632 IS 5 Polyurethane paint two coats, overall paint thickness shall be 150 microns (min)
4.3	**Transformer Protection**	
4.3.1	HV Protection	i) HV protection shall be provided by an internally mounted HV fuse in series with the primary winding. ii) The option of using 11 KV fuse tube (preferably made of fiber glass), connected externally between the terminals of the lightning arrestor and the HV bushing can also be explored. The arrangement shall be such that the fuse tube remains in position when the fuse element inside the fuse tube blows off.
4.3.2	**LT Protection**	
4.3.2.1	MCCB Type	The MCCBs shall be trip free type with quick make and break design. The design of the operating mechanism of the circuit breaker shall be such that it shall have only two positions i.e. 'ON' and 'OFF', it shall not require resetting before being switched to 'ON' position.
4.3.2.2	Utilization Category	A
4.3.2.3	Interrupting medium	Air
4.3.2.4	Design	Molded case
4.3.2.5	Type of operation	Independent manual closing
4.3.2.6	Suitability for isolation	Not suitable for isolation
4.3.2.7	Provision for maintenance	Maintainable

4.3.2.8	Method of installation – fixed	16 kVA	25 kVA	50 KVA
4.3.2.9	Number of poles	2		
4.3.2.10	Rated uninterrupted current (enclosed)	100 A	160 A	315 A
4.3.2.11	Voltage rating	250/415		
4.3.2.12	Rated insulation voltage	1kV		
4.3.2.13	Rated impulse withstand voltage	8kV		
4.3.2.14	Ultimate Breaking Capacity Icu	35 KA min.		
4.3.2.15	Service Breaking capacity Ics	35 KA min.		
4.3.2.16	Rated frequency	50Hz		
4.3.2.17	Rated duty	Uninterrupted duty		
4.3.2.18	Trip current characteristics:			
4.3.2.19	Type of release	Thermal-Magnetic		
4.3.2.20	Overload setting	Variable type 60% to 100% of In. Instep of 10%		
4.3.2.21	Short circuit settings	250% to 900% of In. Insteps of 50%		
4.3.2.22	Trip time at rated uninterrupted current	>2.5 hrs		
4.3.2.23	Trip time at 2.5 Setting times normal current	< 1 minute		
4.3.2.24	Trip time at 6 times normal current setting	< 5 secs.		
4.3.2.25	Trip time at 9 times normal current setting	40 millisec.		
4.3.3	**Coordination of HT Fuse and LT MCCB**	i) The supplier shall furnish the time – current curves. The characteristics of LT MCCB and 11 KV fuse for various current multiples shall be drawn on the same sheet to indicate coordination between the LT MCCB and the HT fuse. ii) The LT MCCB shall operate with time delay for over load above rated capacity of transformer unit. iii) The HT fuse shall be selected such that it shall act as a back up protection for LT system faults and shall provide close co-ordination with LT MCCB iv) The HT fuse shall be selected such that it shall not operate for in rush current during transformer charging		

		v) The HT fuse shall be selected such that it shall operate instantaneously for all internal faults in the transformer. vi) The supplier shall carry out coordination test, as indicated above, on minimum one transformer out of every 50 transformers and this shall form an Acceptance Test by the purchaser. Co-ordination of LT MCCB for external faults and HT fuse for internal faults complete with expected fault currents and I^2t value of MCCB /HT fuse shall be assured/ proved.

5.

6. Fittings and Accessories on Transformer

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 i) Type/kind of transformer with winding material ii) standard to which it is manufactured iii) manufacturer's name; iv) transformer serial number; v) month and year of manufacture vi) rated frequency in Hz vii) rated voltages in kV viii) number of phases ix) rated power in kVA x) type of cooling (KNAN) xi) rated currents in A xii) 1.2/50µs wave impulse voltage withstand level in kV xiii) power frequency withstand voltage in kV xiv) impedance voltage at rated current

		and frequency in percentage xv) Max. Total losses at 50 % rated load xvi) Max. Total losses at 100 % rated load xvii) Load loss at 50% & 100% rated load xviii) Energy efficiency level. xix) continuous ambient temperature at which ratings apply in deg C xx) top oil and winding temperature rise at rated load in deg C; xxi) winding connection diagram with voltage, current and power xxii) transport weight of transformer xxiii) weight of core and windings xxiv) Weight of core xxv) Weight of winding xxvi) total weight xxvii) volume of oil xxviii) weight of oil xxix) name of the purchaser xxx) PO no and date xxxi) Guarantee period xxxii) Manufacturer call center number & email id
5.2	Two earthing terminals with the earthing symbol	Required
5.3	Lifting lugs for complete transformers as well as for core & winding	Required
5.4	Bird guard.	Required
5.5	Pressure relief valve.	Required
5.6	Non return valve.	Required
5.7	Terminal connector	Required
5.8	HV side neutral earthing strip.	Required
5.9	Lightning arrestor	Required
5.10	Terminal marking plate	Required
5.11	Fittings as per IS 1180	Required
5.12	Additional fittings for CSP type of distribution transformers, if any. The fittings and accessories listed are	

	indicative only and any other fittings and accessories which are generally required for satisfactory operation of the transformer are to be provided without any extra cost	

7. Approved make of components

6.1	Bushings	Baroda Bushing/CJI/Jaipur glass
6.2	CRGO	Nippon/JFE/Posco/Thyssen Krupp
6.3	Copper	Birla copper/Sterlite
6.4	Pre compressed Pressboard	Raman Board, Mysore/ Senapathy Whiteley, Dupont
6.5	Laminated Wood	Permalli Wallance / Rochling Engineers
6.6	Natural Ester Oil	Midel/Cargil
6.7	Mineral Oil	Apar/Savita/Raj Petro
6.8	Steel	TATA/Jindal/SAIL
6.9	Surge arrestor	Electrolite Power/Oblum/Tyco
6.10	MCCB	ABB/L&T/Schneider
6.11	Fuse	ERMCO,USA

Note – Any other make of component to be approved by purchaser

8. Quality assurance

7.1	Quality Assurance program	To be submitted before contract award. Program shall contain following i) The structure of the organization ii) The duties and responsibilities assigned to staff ensuring quality of work. iii) The bidder should have qualified technical & dedicated QA personnel at various stages of manufacture & testing. 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. v) The system for purchasing, taking delivery and verification of materials

		vi) The system for ensuring quality of workmanship vii) The system for control of documentation viii) The system for the retention of records ix) The arrangements for the Supplier's internal auditing 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 i) An outline of the proposed work and programme sequence ii) The structure of the Supplier's organization for the contract iii) The duties and responsibilities assigned to staff ensuring quality of work for the contract iv) Inspection Hold and notification points mutually agreed. v) Submission of engineering documents required by the specification vi) The inspection of materials and components on receipt vii) Reference to the Supplier's work procedures appropriate to each activity viii) Inspection during fabrication/construction ix) Final inspection and test 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

9.

10. Progress Reporting

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 i) Progress on material procurement ii) Progress on fabrication iii) Progress on assembly iv) Progress on internal stage inspection v) Reason for any delay in total programme vi) Details of test failures if any in manufacturing stages vii) Progress on final box up viii) Constraints ix) Forward path

11.

12. Inspection & testing

9.1	Inspection and Testing during manufacture	Only type tested equipment shall be acceptable
9.1.1	Tank	i) Check for physical properties of materials for lifting lugs, jacking pads etc. All load bearing welds, including lifting lug welds shall be subjected to required load tests. ii) Certification of all test results. iii) Oil leakage test iv) Vacuum and Pressure test on tank as type test as per IS 1180
9.1.2	Core	i) Sample testing of core material for checking specific loss, bend properties, magnetization characteristics and thickness. ii) Check on the quality of varnish if used on the stampings.

		a) Measurement of thickness and hardness of varnish on stampings. b) Solvent resistance test to check that varnish does not react in hot oil. 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. iii) Check on the amount of burns. iv) Bow check on stampings. v) Check for the overlapping of stampings. Corners of the sheet are to be apart. vi) Visual and dimensional check during assembly stage. vii) 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. viii) Check for inter laminar insulation between core sectors before and after pressing. ix) Visual and dimensional checks for straightness and roundness of core, thickness of limbs and suitability of clamps. x) High voltage test (2 KV for one minute) between core and clamps. xi) Certification of all test results.
9.1.3	Insulating Materials	i) Sample check for physical properties of materials. ii) Check for dielectric strength. iii) Visual and dimensional checks. iv) Check for the reaction of hot oil on insulating materials. v) Certification of all test results.
9.1.4	Windings	i) Sample check on winding

		conductor for mechanical properties and electrical conductivity. ii) Visual and dimensional check on conductor for scratches, dept. mark etc. iii) Sample check on insulating paper for PE value, Bursting strength, Electric strength. iv) Check for the reaction of hot oil on insulating paper. v) Check for the bending of the insulating paper on conductor. vi) Check and ensure that physical condition of all materials taken for winding is satisfactory and free of dust. vii) Check for absence of short circuit between parallel strands. viii) Check for Brazed joints wherever applicable. ix) Measurement of voltage ratio to be carried out when core/ yoke is completely restocked and all connections are ready. 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. ii) Check insulation distance between high voltage connection distance between high voltage connection cables and earthed and other live parts. iii) Check insulation distance between low voltage connection and earthed and other parts. iv) Insulation test of core earthing. v) Check for proper cleanliness vi) Check tightness of coils i.e. no free movement. 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. ii) Check for completeness of drying. iii) Certification of all test results.
9.1.5	Oil	As per IS 16659/ IEC 62770
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 i) Visual and dimension check ii) Measurements of voltage ratio iii) Measurements of winding resistance iv) Measurements of insulation resistance and polarization index v) Separate sources voltage withstand test. vi) Measurement of iron losses and exciting current at rated frequency and 90%, 100% and 112.5% rated voltage. vii) Induced voltage withstand test. viii) Load losses measurement at 50 % & 100 % of load. ix) Impedance measurement x) Routine test of tanks xi) HT fuse and LT MCCB coordination test xii) Oil leakage test on transformer xiii) Certification of all test results. xiv) Temperature Rise Test # #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
9.3	Type Tests	On one transformer of each rating and type at CPRI/ERDA. i) Impulse withstand test

		ii) Temperature rise test as per IS iii) Dynamic & Thermal (3 sec) Short circuit test iv) Air pressure test v) Pressure and Vacuum test on tank vi) Dissolved gas analysis before and after Temperature Rise Test vii) Oil testing to be tested at CPRI/ERDA labs, whose samples shall be selected & sealed by customer. 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
9.3.2	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. 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 quality. In case the product offered is never type tested the same as per above list to be conducted by bidder at his own cost at CPRI/ERDA. The test report shall not be more 5 years old
9.4	Customer Hold Point	i) GTP & Drawings approval ii) Tank Pressure & vacuum Test iii) Core & Coil Stage inspection of each lot to be offered

13. Packing , Shipping, Handling and Storage

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 i) Individual serial number; ii) Purchaser's name; iii) PO number; iv) Destination; v) Supplier's name; vi) Name and address of supplier's agent vii) Description and quantity viii) Manufacturer's name ix) Country of origin x) Case measurements xi) Gross and net weights in kilograms xii) All necessary slinging and stacking instructions.
10.2	Shipping	The bidder shall ascertain at an early date and definitely before the commencement of 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. 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

14.

15. Deviations

11.1	Deviation	Deviations from this Specification shall be provided in excel sheet with tender by reference to the Specification clause/GTP/Drawing and a description of the alternative offer. In absence of such a statement, it will be assumed that the bidder complies fully with this specification.

16. Drawing & Data Submission matrix

Document submission shall be as per the matrix given below. All documents/drawing shall be provided in soft copy (in pen drive) for each section. Language of the documents shall be English only. Deficient/improper drawing submission may liable for rejection.

S No.	Documents to be submitted	Bid	Approval	Pre Dispatch
12.1	Copy of specification along with company seal & signature on each page.	Required	Required	
12.2	Guaranteed technical particulars	Required	Required	
12.3	Outline dimension drawing for each major component, general arrangement drawing showing component layout an general schematic diagrams.	Required	Required	
12.4	Type test certificates, where available, and sample routine test reports	Required	Required	
12.5	Detailed reference list of customers already using equipment offered during the last 5 years with particular emphasis on units of similar design and rating	Required		
12.6	Performance certificates executed in last 5 years	Required		
12.7	Details of manufacturers quality assurance standard and programme and ISO 9000 series or equivalent national certification.	Required		
12.8	Deviations from this specification. Only deviations approved in writing before award of contract shall be accepted.	Required		
12.9	Recommended spare parts and consumable items for the five years of operation with prices and spare parts catalogue with price list for future requirements.	Required		
12.10	Transport / shipping dimension and weights, space required for handling parts for maintenance	Required		
12.11	Write up on oil preservation system.	Required	Required	
12.12	Quality assurance program.	Required	Required	
12.13	Programme for production and testing		Required	

12.14	General description of the equipment and all components, including brochures		Required	
12.15	Detailed dimension drawing for all components ,general arrangement drawing showing detailed component layout and detailed schematic and wiring drawings for all components like Lightning arrestor, birdguard, bushings		Required	
12.16	Calculations to substantiate choice of electrical, structural, mechanical component size, ratings		Required	
12.17	Termination arrangement		Required	
12.18	Flow diagram of cooling system showing no. of cooling banks		Required	
12.19	Drawings of major components like bushing,LA, MCB etc		Required	
12.20	Lists of makes of all fittings and accessories		Required	
12.21	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		Required	
12.22	Detailed installation and commissioning instructions		Required	
12.23	Inspection and test reports carried out in manufacturers works			Required
12.24	Test certificates of all bought out items.			Required
12.25	Operation and maintenance instructions as well as trouble shooting charts.			Required

17. Annexure – A Service Conditions

1.0	Delhi Atmospheric conditions	
1.1	Average grade atmosphere :	Heavily polluted, dry
1.2	Maximum altitude above sea level	1000 M
1.3	Ambient Air temperature	Highest 50 deg C, Average 40 deg C
	Design ambient temperature	50 deg C
1.4	Relative Humidity	90 % Max
1.5	Seismic Zone	4
1.6	Rainfall	750 mm concentrated in four months

18. Annexure – B Technical Particulars of Natural Ester Oil

The Natural Ester Oil shall be certified as K Class as per IS 16659/IEC 62770.

Sr. No	Item description	Specification requirement
4.1.0	Physical property	
4.1.1	Appearance	Clear, free from sediments and suspended matter.
4.1.2	Viscosity	
4.1.2.1	At 100° C, Max	15 mm2/sec
4.1.2.2	At 40°, , Max	50 mm2/sec
4.1.3	Pour point , Max	-10° C
4.1.4	Water content, Max	200 mg/kg (ppm)
4.1.5	Density at 200C, Max	1.0 g/ cm^3
4.2.0	Electrical property	
4.2.1	Dielectric breakdown voltage (2.5 mm gap), Min	65kV
4.2.2	Dielectric Dissipation factor (Tanδ) at 900 C, Max	0.05
4.3.0	Chemical property	
4.3.1	Soluble acidity, Max	0.06 mg KOH/gm
4.3.2	Corrosive sulfur	Non corrosive
4.3.3	Total additives, Max	weight fraction 5%
4.4.0	Performance-After oxidation stability test	
4.4.1	Total acidity, Max	0.6 mg KOH/g
4.4.2	Viscosity at 40^0 C, Max	30% increase over the initial value
4.4.3	Dielectric Dissipation factor (Tanδ) at 90^0 C, Max	0.5
4.5.0	Health, safety and environment (HSE)	
4.5.1	Fire point, Min	300° C
4.5.2	Flash point, Min	250°C
4.5.3	Biodegradation	Readily biodegradable

19. Annexure – C Guaranteed Technical Particulars (Data by Seller)

S. No.	Description	Specified/Required	Offered
1.0	Name of manufacturer		
2.0	Type		
3.0	Ratings		
3.1	Nominal Continuous Rating, KVA	16/25/50kVA	
3.2	Rated voltage-HV, Volts	11/√3 kV	
3.3	Rated voltage-LV, Volts	240V	
3.4	Rated current-HV, Amps		
3.5	Rated current-LV, Amps		
3.6	No load voltage ratio		
3.7	Number of phases		
3.8	Frequency, Hz	50 Hz	
4.0	Connections		
4.1	High voltage		
4.2	Low voltage		
5.0	Method of cooling	KNAN	
6.0	Impedance voltage at rated voltage and frequency at 75^0C	4% with IS tolerance	
6.1	Impedance		
6.2	Reactance		
6.3	Resistance		
7.0	Resistance of the winding at 75^0C in ohm		
7.1	HV		
7.2	LV		
8.0	Guaranteed maximum Total Losses (no load losses+load losses at 75 deg.C), Watt		
8.1	50% of load		
8.2	100% of load	as per Spec Cl 3.24	
8.3	No Load Loss (Max)	as per Spec Cl 3.25	
8.4	Total I^2R losses of windings @ 75 deg C, Watt		
8.5	Total stray loses @ 75 deg C, Watt		
8.6	Total Load losses (Max.), Watt		
8.7	No load loss at maximum permissible voltage and frequency (approx.), Watt		
9.0	Temperature rise over reference ambient of 50^0 C		
9.1	Top oil by thermometer	35^0 C	
9.2	Winding by resistance	40^0 C	

9.3	Temperature of hottest spot in the winding at full load , ^{0} C		
10.0	Efficiency		
10.1	Efficiency at 75^{0}C and unity power factor, %		
10.1.1	at 110% load		
10.1.2	at 100% load		
10.1.3	at 80% load		
10.1.4	at 60% load		
10.1.5	at 40% load		
10.1.6	at 20% load		
10.2	Efficiency at 75^{0}C and 0.8 power factor lag, %		
10.2.1	at 110% load		
10.2.2	at 100% load		
10.2.3	at 80% load		
10.2.4	at 60% load		
10.2.5	at 40% load		
10.2.6	at 20% load		
10.3	Maximum efficiency at 75^{0}C, %		
10.4	Load and power factor at which it Occurs		
11.0	Regulation, (%)		
11.1	Regulation at full load at 75^0 C		
11.1.1	at unity power factor		
11.1.2	at 0.8 power factor lagging		
11.2	Regulation at 112.5% load at 75^0 C		
11.2.1	at unity power factor		
11.2.2	at 0.8 power factor lagging		
12.0	Details of tank		
12.1	Type	Sealed type with bolted cover which seals the interior of the tank from atmosphere.	
12.2	Material	Tank should be round and made of good quality sheet steel	
12.3	Thickness of tank sheet		
12.3.1	Sides, mm		
12.3.2	Top, mm		
12.3.3	Bottom, mm		
12.4	Confirmation of Tank designed and tested for Vacuum, Pressure As per IS 1180(Yes/ No)		

12.4.1	Vacuum mm of Hg. / (kN/m^2)	As per IS 1180	
12.4.2	Pressure mm of Hg.		
12.5	Is the tank lid sloped?	Yes	
13.0	Core		
13.1	Type	Core	
13.2	Core material grade	Premium grade minimum M3 or better	
13.3	Core lamination thickness in mm		
13.4	Insulation of lamination	With insulation coating on both sides	
13.5	Details of core		
13.5.1	Core material grade	Premium grade minimum M3 or better	
13.5.2	Diameter, mm		
13.5.3	Cross sectional area, mm^2		
13.5.3.1	Gross, mm^2		
13.5.3.2	Net, mm^2		
13.5.4	Window height, mm		
13.5.5	Limb center, mm		
13.5.5	Weight of stamping in core and yoke separately		
13.5.6.1	Core, kgs		
13.5.6.2	Yoke, kgs		
13.5.6.3	Total, kgs		
13.6	Design flux density at rated voltage , Tesla		
13.7	Maximum flux density at 12.5 % over excitation /over fluxing, Tesla	1.9 Tesla Max allowed	
13.8	Guaranteed No Load current at 100% rated voltage , Amps		
13.8.1	HV		
13.8.2	LV		
13.9	Guaranteed No Load current At 110% rated voltage, Amps		
13.9.1	HV		
13.9.2	LV		
14.0	HV coil construction details		
14.1	Type of winding		
14.2	Size of conductor (Bare), mm		
14.3	Cross sectional area of conductor, mm^2		
14.4	Number of coils per limb		
14.5	Outer diameter of coil, mm		
14.6	Inner diameter of coil, mm		

14.7	Insulation of conductor		
14.8	Interlayer reinforcement detail		
14.9	Current at full load, Amp		
14.10	Normal working current density, Amp/mm^2		
14.11	End turn insulation		
14.12	Weight of bare conductor used in one leg of HV, kg		
14.13	Weight of insulated conductor used in one leg of HV, kg		
14.14	Number of turns per leg		
14.15	Length of mean turns, mm		
14.16	Axial length, mm		
15.0	LV coil constructional details		
15.1	Type of winding		
15.2	Size of conductor (Bare), mm		
15.3	Cross sectional area of conductor, mm^2		
15.4	Number of coils per limb		
15.5	Outer diameter of coil, mm		
15.6	Inner diameter of coil, mm		
15.7	Insulation of conductor		
15.8	Interlayer reinforcement detail		
15.9	Current at full load, Amp		
15.10	Normal working current density, Amp/mm^2		
15.11	End turn insulation		
15.12	Weight of bare conductor used in one leg of LV, kg		
15.13	Weight of insulated conductor used in one leg of LV, kg		
15.14	Number of turns per leg		
15.15	Length of mean turns, mm		
15.16	Axial length, mm		
16.0	Insulation details material and size		
16.1	HV coil end packing	TUP paper	
16.2	LV coil end packing		
16.3	Inter coil spacer of HT sections		
16.4	Bottom core strip insulation		
16.5	Yoke insulation		
16.6	Clamp insulation		
16.7	Inter phase barrier		
16.8	Core wrap		
16.9	Cylindrical insulation between HT & LT		
16.10	Type of blocks used between coils		
17.0	Details of clearances		

17.1	Internal clearance between inner walls of tank and core coil assembly unit, mm		
17.2	Radial clearance between LV and HV winding, mm		
17.3	Phase to phase clearance between HV limb, mm		
17.4	Clearance from top of the yoke to the inside of the top cover of tank, mm		
17.5	Radial clearance of LV coil from core, mm		
17.6	Horizontal duct between HT sectional coil		
17.7	End clearance of HT coil from yoke, mm		
17.8	Minimum clearance between core and tank bottom, mm		
18.0	Impulse test voltage of winding for 1.2/50 micro seconds wave according to relevant IS		
18.1	HV		
18.2	LV		
19.0	Volts per coil of HV winding, Volts		
20.0	Approximate volts per layer of HV winding, Volts		
21.0	Induced over voltage test at double frequency		
22.0	Permissible duration of overload following continuous running at normal rated load in ambient temperature of 50^0C		
22.1	10%overload		
22.2	20%overload		
22.3	30%overload		
23.0	RMS value of symmetrical short circuit current which the transformer can withstand and its duration		
24.0	Terminal arrangement of HV side		
25.0	Terminal arrangement of LV side		
26.0	Particulars of HV bushing		
27.1	Make		
27.2	Type		
27.3	Dry withstand voltage for one minute		
27.4	Wet withstand voltage for thirty minutes		
27.5	Voltage rating		
27.6	Impulse withstand voltage 1.2/50		

	micro second wave		
27.7	Total creepage distance in air	mm	
27.8	Height of bushing above transformer tank		
28.0	Particulars of LV neutral bushing		
28.1	Make		
28.2	Type		
28.3	Voltage rating		
28.4	Dry withstand voltage for one minute		
28.5	Wet withstand voltage for thirty minutes		
28.6	Total creepage distance in air, mm		
28.7	Height of bushing above transformer Tank, mm		
29.0	Time constant of transformer		
30.0	MCCB rating		
30.1	Make and model no.		
30.2	Utilization Category	A	
30.3	Interrupting medium	Air	
30.4	Design	Molded case	
30.5	Type of operation	Independent manual closing	
30.6	Voltage rating	240/415	
30.7	Number of poles	2	
30.8	Rated insulation voltage	1kV	
30.9	Rated impulse withstand voltage	8kV	
30.10	Rated frequency	50Hz	
30.11	Rated duty	Uninterrupted duty	
30.12	Ultimate Breaking Capacity Icu	35 KA min.	
30.13	Service Breaking capacity Ics	35 KA min.	
30.14	Trip current characteristics		
30.14.1	Rated current		
30.14.2	Overload setting	60% t0 100% of In. Insteps of 10%	
30.14.3	Short circuit settings		
30.14.4	Trip time at rated uninterrupted current	>2.5 hrs	
30.14.5	Trip time at 2.5 Setting times normal current	< 1 minute	
30.14.6	Trip time at 6 times normal current setting	< 5 secs.	
30.14.7	Trip time at 9 times normal current setting	40 millisec.	
31.0	HV fuse rating		

31.1	Make		
31.2	Tripping curves provided	Yes/No	
31.3	Fuse catalogue is provided	Yes/No	
31.4	Tripping coordination graph of HV fuse and MCCB is provided	Yes/No	
32.0	Transformer oil		
32.1	Dielectric strength		
32.2	Resistivity		
32.3	Acidity		
32.4	Tan delta		
32.5	Name of supplier		
32.6	Quantity of transformer oil, Liters		
33.0	Weight of the following		
33.1	Tank and fittings, Kgs		
33.2	Core, Kgs		
33.3	Winding weight, Kgs		
33.4	Core and windings, Kgs		
33.5	Transformer oil, Kgs		
33.6	Total weight of transformer including oil, Kgs		
34.0	Overall dimensions of transformer		
34.1	Length	mm	
34.2	Breadth	mm	
34.3	Height	mm	
35.0	Name of material and size used for clamping of core winding		
35.1	Core clamp		
35.2	Tie rod		
35.3	Core bolt		
35.4	Bottom plate		
36.0	Tests		
36.1	Is the offered 16/25/50 kVA distribution transformer type tested? (Yes, No)		
36.2	All in process tests confirmed as per Cl. 9.1 (Yes/ No)		
36.3	All Routine Tests confirmed as per Cl.9.2 (Yes / No)		
36.4	All Type Tests confirmed as per Cl.9.3 (Yes/ No)		

20. Annexure – D Guaranteed Technical Particulars of Natural Ester oil

Bidder to submit duly filled & signed along with techno commercial offer.

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	Physical property		
2.1	Appearance	Clear, free from sediments and suspended matter.	
2.2	Viscosity		
2.2.1	At 100° C, Max	15 mm^2/sec	
2.2.2	At 40°, , Max	50 mm^2/sec	
2.3	Pour point , Max	-10° C	
2.4	Water content, Max	200 mg/kg (ppm)	
2.5	Density at 20° C, Max	1.0 g/ cm^3	
3.0	Electrical property		
3.1	Dielectric breakdown voltage(2.5 mm gap), Min	65kV	
3.2	Dielectric Dissipation factor (Tanδ) at 900 C, Max	0.05	
4.0	Chemical property		
4.1	Soluble acidity, Max	0.06 mg KOH/gm	
4.2	Corrosive sulfur	Non corrosive	
4.3	Total additives, Max	weight fraction 5%	
5.0	Performance-After oxidation stability test		
5.1	Total acidity, Max	0.6 mg KOH/g	
5.2	Viscosity at 400 C, Max	30% increase over the initial value	
5.3	Dielectric Dissipation factor (Tanδ) at 90° C, Max	0.5	
6.0	Health, safety and environment (HSE)		
6.1	Fire point, Min	300° C	
6.2	Flash point, Min	250° C	
6.3	Biodegradation	Readily biodegradable	
7.0	Packing & delivery as per specification		YES / NO
7.1	Size of oil drum	210 liter minimum	
7.2	Quantity of oil to be supplied in DRUM		
8.0	Copy of Type test report	Submitted along with GTP?	YES / NO
9.0	Deviation sheet	Submitted along with GTP?	YES / NO

21. Annexure – E Recommended Spares (Data by Supplier)

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	

Annexure-A Approved Makes List

This is in addition to the technical specification, for any component not mentioned in this list technical specification shall be followed

Item	**Approved Makes as per BRPL Tech Specs**
Valves	Newman/Atam/ **Mahaveer/Hari Industries**
Bushings	Baroda Bushing/CJI/JP/**Genesis**
CRGO	Nippon/JFE/Posco/Thysenkurup
Copper	Birla copper/Sterlite
Pre compressed Pressboard	Raman Board, Mysore/ Senapathy Whiteley
Laminated Wood	Permalli Wallance / Rochling Engineers
Oil	**Cargill/Midel/Apar/Savita**
Steel	TATA/Jindal/SAIL
Lugs/Glands	Jainson/Dowells/Comet/**HEX/Braco/Ascon**
MCCB	**ABB/L&T/Schneider/HPL/HAVELLS**
Fuse	**ERMCO/Trans Guard Electrical System**
Surge arrestor	Electrolite Power/Oblum/Tyco

Note –

1. **All text in bold have been revised in this amendment**
2. **Any other make of component offered by the bidder during tender evolution stage, may be reviewed & approved by BSES.**

BSES

TECHNICAL SPECIFICATIONS

FOR

THREE PHASE OIL TYPE DISTRIBUTION TRANSFORMER

25 KVA TO 100 KVA

Specification no – BSES-TS-62-TPDT-R0

Revision		0
Date		13/06/2022
Pages		42
Prepared by	Jeena Borana	
	Vani Sood/ Pronab Bairagi	13/06/2022
Reviewed by	Srinivas Gopu	
	Amit Tomar	
Approved by	Gaurav Sharma	
	Gopal Nariya	

CONTENTS

Record of Revision

S.No.	Revision No	Item/Clause No.	Nature of change	Approved by

1.0 SCOPE

1.1 This specification covers design, engineering, manufacturing, assembly, testing at manufacture's works, packing, transportation and delivery to store and submission of complete documentation for three phase conventional oil filled distribution transformer of rating 25 to 100KVA rating.

1.2 The transformer shall be complete with all components and accessories, which are necessary or usual for their efficient performance and trouble free operation under the various operating and atmospheric conditions specified in Annexure I : Data sheet of client requirement.

1.3 Such of the parts that may have not been specifically included, but otherwise form part of the transformer as per standard trade and/or professional practice and/or are necessary for proper operation of transformer, will be deemed to be also included in this specification. The successful bidder shall not be eligible for any extra charges for such accessories etc. notwithstanding the fact that at the time of an initial offer bidder had segregated such items and quoted for them separately.

2. CODES AND STANDARDS

2.1 All equipment and material shall be designed, manufactured and tested in accordance with the latest applicable Indian Standards, IEC standard and CBIP manuals enlisted in the Appendix-A, except where modified and / or supplemented by this specification.

2.2 Equipment and material conforming to any other standard, which ensures equal or better quality, may be accepted. In such case copies of English version of the standard adopted shall be submitted by the vendor with the offer.

2.3 The electrical installation shall meet the requirement of Indian Electricity Rules as amended up to date, relevant IS code of practice and Indian electricity act. In addition other rules & regulations applicable to the work shall be followed. In case of any discrepancy, the most stringent & restrictive one shall be binding.

2.4 The equipment offered shall in general comply with the latest issues including amendments of the standards enlisted in Appendix-A but not restricted to it.

2.5 Vendor shall possess valid BIS Certification.

3. DESIGN

The design and workmanship shall be in accordance with the best engineering practices to ensure satisfactory performance throughout the service life. The features and construction

details of each transformer shall be in accordance with the requirements stated herein under.

3.1 APPLICATION

The transformers are intended to be used for normal operation in Delhi Distribution system for making available three phase and/or single phase supply to the consumers at voltage as indicated in Annexure-I.

3.2 RATINGS

The transformer shall be of rating as indicated in Annexure-I.

3.3 NORMAL SITE CONDITIONS

The distribution transformers to be supplied against this Specification shall be suitable for satisfactory continuous operation under the conditions as per Annexure-I: Data sheet of client requirement.

3.4 TRANSFORMER TANK

3.4.1 The Transformer tank shall be of plain rectangular / octagonal and made of good quality sheet steel of adequate thickness suitably stiffed to provide sturdy and robust construction to withstand extreme pressure conditions. The tank shall be capable of withstanding pressure as per values specified in IS: 1180 (Part - I) in Appendix-A for non-sealed type Transformers.

3.4.2 The tank cover shall have plasticized surface at the top to guard against bird age faults. Alternatively, suitable insulating shrouds shall be provided on the bushing terminals.

3.4.3 Steel surface of the tank shall be prepared by sand/shot blast or chemical cleaning including phosphating as per IS: 3618

3.4.4 Heat resistance paint (Hot oil proof) shall be provided inside the tank.

3.4.5 On external surfaces two coats of zinc chromate primer followed by two coats of anti-condensation type polyurethane paint, having minimum dry film thickness of 80 microns. Paint of shade conforming to No.632, Adminarly grey shade of IS-5 of 1961 as in Annexure-1 shall be provided.

3.4.6 The transformer shall have a self-pressure venting system.

3.5 BUSHING AND TERMINALS

3.5.1 All bushings shall be porcelain clad, and shall be sealed to prevent ingress of moisture and to facilitate removal. The HV bushings shall be fitted with moulded heat shrinkage insulating covers suitable for bare overhead conductor / Aerial bunched cables / U/G cables.

The HV Bushing shall be of open type terminal and LV Terminals shall be inside the Cable Box. The bushing stems/terminals for all HV phases, made of suitable copper alloy shall be so designed as to directly receive aluminium stranded overhead conductors with bolted type clamping arrangement both in horizontal and vertical directions. In case of copper/copper alloy stems, suitable bimetallic clamps with bolted type arrangement described above shall be used. If HT Underground Cables or Aerial bunched cables are used, then all the terminals shall be connected with suitable Al. lugs. Bimetallic washers shall be provided in between connection of Copper and Aluminium conductors.

3.5.2 LV cable box shall be provided with the proper facilities for taking out 3 phase and neutral supplies to the LV distribution board. Additional neutral terminal bushing shall be made available on the cable box for connection to separate earth.

3.5.3 For 25kVA & 63KVA transformer LV Cable box shall be with inbuilt, insulated bus bar with MCCB of appropriate ratings with 25kA breaking current capacity). All covers and flanges and joints shall be fixed by secure tamper- proof anti-theft fasteners with following features:

i. All the fasteners shall be of secure anti-theft design with special non-standard/rare drive head slots and round head such that they cannot be tightened or removed with a regular wrench.
ii. Head slots of shape “plus”, “minus”, or “allen (hexagonal)” shall not be used, as drive wrenches for such head slots are readily available in market.
iii. Special drive bit or wrench or key Special driver bit or wrench or key, one no. per transformer, shall be supplied to tighten or remove such secure fasteners

3.5.4 Suitable gland plate, cable glands and lugs as required shall be supplied with the cable box.

3.6 CONSERVATOR

3.6.1 In the distribution transformers of 63 and 100 kVA, rating the provisions of conservator is mandatory and for 25 kVA transformers the manufacturers may adopt their standard practices.

3.6.2 When a conservator is fitted, the conservator shall be provided with a drain plug and a filling hole with a cover. In addition, the cover of the main tank shall be provided with an air release plug to enable trapped air to be released unless the conservator is so located as to eliminate the possibility of air being trapped within the main tank.

3.6.3 The inside diameter of the pipe connecting the conservator to the main tank shall be within 20 to 50 mm and it should projected into the conservator so that its end is approximately 20 mm above

the bottom of the conservator, so as to create a sump for collection of impurities. The minimum oil level (corresponding to –5deg. C) should be above the sump level.

3.7 FITTINGS

The following standard fittings shall be provided for both sealed and non-sealed type transformers.

a) Two earthing terminals with facility to connect 50x6 MM GI Strip. The terminals Shall be located on the lower side of the transformer and be of M12 size. Each shall be clearly indicated with an engraved 'Earth' symbol.
b) Two Nos heavy duty lifting lugs.
c) Rating and terminal marking plate(s) as per this specification and IS 1180 part 1
d) Plain breathing device comprising an inverted U-pipe with wire gauze at the open end (to prevent entry of insects). Silica gel breather or any other type of breather as required.
e) Drain-cum-sampling valve (steel) welded to the tank. Special tool for operating this valve shall be supplied with the transformer. All valves shall have locking arrangement.
f) Oil filling hole, with cover having 1-1/4" nominal size threads on the transformers body/conservator.
g) Oil level gauge indicating oil levels.
h) Thermometer pocket with cap.
i) Terminal connectors.
j) Pressure relief device or explosion vent.
k) Dial Type thermometer working as OTI for 100 KVA
l) CT Terminal Box for all the ratings.
m) MOG to be provided with 2(NO+NC) for trip and alarm-with aux contact wired up to separate terminal box for 100 KVA

3.8 CORE AND WINDINGS

3.8.1 The core shall be constructed from high grade cold rolled, non-ageing, grain oriented silicon sheet steel and shall be properly annealed to relieve stresses.

- Core shall be in the form of step and stack in three limb format.
  Note: No wound core shall be acceptable

3.8.2 The HV and LV windings for these transformers shall be wound using high conductivity Copper of electrolytic grade for above 25KVA to 100KVA Transformers and high conductivity Aluminium of electrolytic grade for 25KVA & 63KVA Transformer.

- Type of winding
  LV: Spiral/ Helical
  HV: Crossover/Disc
  Note: No foil winding shall be acceptable

3.8.3 DPC insulation shall be used for HV and LV winding wires and electrical grade plain insulation Kraft paper for interleaving, no material which can be deleteriously affected by the action of oil under the operating conditions of the transformers shall be used in the transformers or leads of the bushings.

3.8.4 The core and coil assembly shall be securely held in position to avoid any movement under short- circuit conditions.

3.8.5 All turns of windings shall be adequately supported to prevent movement, in cases where turns are spaced out, a suitable inter-turn packing shall be provided. The insulation between core and bolts and core & clamps shall be suitable for withstanding 2000 Volts minimum, for one minute.

3.8.6 Winding Connections

The primary winding shall be connected in delta and the secondary winding in star (Vector Symbol Dyn11), so as to produce a positive displacement of 30^{O} from the primary to the secondary vector of the same phase. The neutral of the secondary winding shall be connected to a separate insulated terminal.

Off circuit taps shall be provided on HV winding with tapings of +2.5% to -5% (4 Nos. taps in steps of +2.5%, 0, -2.5% & - 5%) etc. Tapping switch shall only be provided for 100KVA transforms.

3.9 TAPS

The tap switch shall be of rotary type with operating voltage of 11KV & continuous current rating of 60Amps for 100KVA rating transformer.

3.10 MOUNTING ARRANGEMENT

The transformers are to be mounted on MS channel on PCC pole DP structure or steel pole DP structure. The transformer therefore shall be provided with suitable and robust mounting arrangement. The under base of transformer shall be provided with two nos. 75 x 40mm MS channel, 460mm long with slots/holes 18 mm x 21mm for fixing on a platform on plinth. The mounting arrangement drawing shall be furnished for approval.

3.11 RATING AND TERMINAL MARKING PLATE

The transformer shall be provided with non-detachable rating marking plate / Diagram plate(s) of non-corroding, weather proof material, fitted in a visible position and showing the complete information as in IS : 1180 (Part - I).Rating plate shall also include Transformer Actual

%Z, No-Load Loss & Full-Load Loss at 75°C and total losses (No load losses + load losses at 75 °C) at 50 % of rated load and at 100 % of rated load along with details like PO No, date, name of the company BSES. The name plate marking shall be done with fluorescent colour. Serial No. of the transformer shall be written with fluorescent paint on the body of each transformer so that the same can be read from the ground.

3.12 LIMITS OF TEMPERATURE RISE

The temperature rise over the maximum ambient temperature of 50^0C shall not exceed the limits of 40^0C (measured by resistance) for transformer windings and 35^0C (measured by thermometer) in top oil, when tested in accordance with IS: 2026.

3.13 LOSSES AND IMPEDENCE VALUES

- The total losses (no load and load losses at 75 ºC) at 50% and 100% of rated load shall not exceed the maximum total load values given in below table.

KVA	Maximum total losses (Watts)	
	50 % load	100 % load
25	190	635
63	340	1140
100	475	1650

These losses are maximum allowable and there would not be any plus tolerance.

- The percentage impedance at 75o C shall be 4.5% with IS tolerances as per IS 1180.

3.14 OVERFLUXING

The transformer shall be suitable for over fluxing (due to combined effect of voltage and frequency) up to 12.5%, without injurious heating or saturation at full load conditions.
The maximum flux density in any part of the core under such condition shall not exceed 1.9 Tesla. The supplier shall furnish necessary design data in support of this stipulation.

3.15 TRANSFORMER OIL

- It Should be in accordance with specification as per Annex III of this document One sample of oil drawn from every lot of transformer offered for final inspection should

be tested at CPRI/ERDA for tests as listed in IS 1866.

- Sample for oil testing shall be drawn from any transformer (chosen by BSES) from each offered lot after conducting acceptance tests during final inspection of the offered lot.
- The cost of this testing shall be borne by the transformer manufacturer.
- 10% extra oil to be furnished in separate nonreturnable drum with each transformer

4.0 QUALITY ASSURANCE

4.1 General

The Supplier shall adopt suitable quality assurance program and procedures to ensure that all activities are being controlled as necessary. The Supplier shall indicate following in the quality assurance plan – **Hold Point** "A stage in the material procurement or workmanship process beyond which work shall not proceed without the documented approval of designated individuals or organizations."

The Purchaser's written approval is required to authorize work to progress beyond the Hold Points indicated in approved quality plans.

Notification Point "A stage in material procurement or workmanship process for which advance notice of the activity is required to facilitate witness." If the Purchaser does not attend after receiving documented notification in accordance with the agreed procedures and with the correct period of notice then work may proceed.

4.2 Quality Plans

The Supplier shall draw up for each section of the work quality plans which shall be submitted to the Purchaser for approval at least two weeks prior to the commencement of work on the particular section. Each quality plan shall set out the activities in a logical sequence and, unless advised otherwise, shall include the following:

- An outline of the proposed work and programme sequence
- The structure of the Supplier's organisation for the contract
- The duties and responsibilities assigned to staff ensuring quality of work for the contract
- Hold and notification points
- Submission of engineering documents required by the specification
- The inspection of materials and components on receipt
- Reference to the Supplier's work procedures appropriate to each activity
- Inspection during fabrication/construction
- Final inspection and test

4.3 Sub-suppliers

The Supplier shall ensure that the quality assurance requirements of this specification are

followed by any sub-suppliers appointed by him under the Contract.
The Supplier shall assess the sub-supplier's quality assurance arrangements prior to his appointment to ensure compliance with the specification.
Auditing of the sub-supplier's quality assurance arrangements shall be carried out by the Supplier and recorded in such a manner that demonstrates to then Purchaser the extent of the audits and their effectiveness.

4.4 Warranty

The Supplier shall warranty the following:

- Quality and strength of materials used.
- Satisfactory operation during the warranty period of 60 months from the date of commissioning, or 66 months from the date of delivery of the material at BSES store, whichever is earlier.
- Performance figures as supplied by the Bidder in the schedule of guaranteed particulars.
- The offered surface treatment shall protect the treated metal from corrosion for a period of not less than five years from the date of delivery.

5.0 INSPECTION AND TESTING

5.1 INSPECTION

5.1.1 The manufacture shall carry out comprehensive inspection and testing during manufacturing of the transformer.

5.1.2 The manufacturer shall carry out all type tests and routine tests on the transformer and special test if required any, shall be carried out as per IS by mutual arrangement between purchaser and supplier. The charges, if any, for conducting each of the type tests and special tests shall be indicated separately in the tender.

5.1.3 The purchaser reserves the rights to waive off certain or all tests.

5.1.4 All external components and fittings that are likely to affect the performance of the transformer during the test shall be in its place.

5.2 TESTS

Following tests are to be conducted by the vendors in the presence of BSES representative, Please note that without BSES clearance, vendor shall not proceed with manufacturing at any stage of work,

5.2.1 CORE TEST

Core cutting and testing to be witnessed by BSES representative in accordance with annexure-IV. One sample of CRGO sheet to be sealed for testing at ERDA/CPRI once per P.O. (applicable for 100 KVA only)

Following Tests shall be conducted on the sample:

- Specific core loss measurement
- Magnetic polarization
- Magnetic permeability
- Specific core loss measurement after accelerated ageing test
- Surface insulation resistivity
- Electrical resistivity measurement
- Stacking factor
- Ductility(Bend test)
- Lamination thickness
- Magnetization characteristics (B-H curve)

5.2.2 STAGE INSPECTION

All winding, core assembly, core-coil assembly and tank shall be witnessed, checked and verified by BSES representative in accordance with annexure-V at manufacturer's works.

5.2.3 ROUTINE & ACCEPTANCE TESTS:

All transformers shall be witnessed, checked and verified by BSES representative to the following routine tests at the manufacturer's works and in accordance with IS: 2026 and IS: 1180 (Part – I & II, Appendix-A) and shall be deemed to be included in the supplier's scope:

- Measurement of winding resistance at all taps.
- Measurement of voltage ratio and check of voltage vector relationship at all taps
- Measurement of impedance voltage/short-circuit impedance and load loss at 50 % &100 % of load.
- Measurement of no-load loss and no load current
- Measurement of insulation resistance and polarization index.
- Magnetic balance test.
- Induced over voltage withstand test
- Separate source voltage withstand test

- Oil breakdown voltage test.
- Over voltage withstand capability Test.
- Pressure test
- Oil leakage test
- Temperature rise test(To be conducted on lowest tap)

5.2.4 TYPE TESTS

Following type tests shall be conducted as per IS

- Lightning impulse test
- Heat run test (HRT)
- Short-circuit test (Dynamic short circuit tests & Thermal withstand test for 3 seconds)
- Air Pressure test

Following procedures are to be complied with respect to type tests:

a) The product offered must be of type tested quality as per relevant IS from. Type test carried out in last five year will be valid.
In case type test report is more than 5 years old & less than10 years old with no change in design, then also it is valid for participation.
Note: In case bidder has conducted type test from KEMA/PEHLA/CESI, same shall be considered for bid participation

b) In case the bidder is 1st time participated in BSES, then they have to conduct the type test from CPRI/ERDA on BSES design without any cost implication to BSES.

c) In case bidder had earlier conducted and having valid type tests report on BSES design/supplies, then they don't need to conduct the type test,
In case type test report is more than 5 years old & less than 10 years old with no change in design, then bidder do not need to conduct the type test from CPRI/ERDA

d) In case type test report is more than 10 years old then bidder has to conduct complete type test from CPRI/ERDA without any cost implication to BSES.

5.2.5 TRANSFORMER OIL TESTING

- Dissolved Gas Analysis (DGA) before and after Heat Run Test (HRT) shall be done on one unit per Purchase order from CPRI/ERDA.
- Complete oil testing as per IS 1866 shall be done on one unit from each lot from CPRI/ERDA.

6 PACKING, SHIPPING, HANDLING AND STORAGE

6.1 Packing shall be sturdy and adequate to protect all assemblies, components and accessories from injury by corrosion, dampness, heavy rains, breakage and vibration encountered during transportation, handling and storage at the plant site. All accessories, which are likely to get damaged during transit if transported mounted on the equipment, shall be removed, adequately packed and shipped separately. All openings shall be sealed. Spare parts shall be packed separately and clearly marked. They shall be specially packed for long storage without injury.

6.2 The bidder shall after proper painting, pack and crate all plant equipment for sea shipment/air freight in a manner suitable for export to a tropical humid and saline air borne climate region as per Internationally accepted export practice in such a manner so as to protect it from damage and deterioration in transit by road, rail and/or sea and during storage at site till the time of erection. The bidder shall be held responsible for all damages due to improper packing.

6.3 The bidder shall give complete shipping information concerning the weight, size, contents of each package including any other information the Purchaser may require. The weight and size of the package shall be such that they can be easily transported from the maker's works to the plant site by ship/air, road ways and railways.

6.4 The bidder shall ascertain at an early date and definitely before the commencement of 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, up to the plant site. Any modifications required in the infrastructure and cost thereof in this connection shall be done and borne by the bidder.

6.5 The bidder shall prepare detailed packing list of all packages and containers, bundles and loose materials forming each and every consignment dispatched to 'site'. The bidder shall further be responsible, for making all necessary arrangements for loading, unloading and other handling right from his works; and from Indian port for equipment under the Off-shore Supply till the 'site' and also till the equipment is erected, tested and commissioned. The bidder shall be solely responsible for proper storage and safe custody of all equipment.
Each packing case shall be indelibly marked, on two adjacent sides and on the top, with the following:

- Individual serial number.
- Purchaser's name.
- Contract number.
- Destination.

- A colour coded marking to indicate destination.
- Supplier's name.
- Name and address of Supplier's agent.
- Description and number of contents.
- Manufacturer's name.
- Country of origin.
- Case measurements.
- Gross and net weights in kilograms.
- All necessary slinging and stacking instructions.

Each crate or container shall be marked clearly on the outside of the case to show TOP and BOTTOM positions with appropriate signs to indicate where the mass is bearing and the correct positions for slings. Six copies of each packing list shall be sent to the Purchaser prior to dispatching the equipment.

7 INSPECTION EXPENSES

Inspection (i.e. routing test, acceptance test, type test, factory visit etc.) shall be done any time by BSES on the basis of P.O. or may involve 3rd party as per BSES requirement.
Any kind of test (routine/type test/acceptance test if any) at 3rd lab (i.e. CPRI/ERDA/NABL approved lab) shall be carried out by seller at their own cost.

APPENDIX-A

LIST OF APPLICABLE CODES AND STANDARDS

All Material against this specification shall conform in all respect to the relevant Indian standard specification
/ International Standard Specification, with latest amendments from time to time, thereof, some of which are listed below:

Indian Standard	**Title**
IS-2026/2011	Specification for Power Transformer
IS-1180/2014	Outdoor distribution transformer up to and including 2500 KVA
IS-335/2018	Specification for oil
IS-2099-1986	Specification for High voltage Porcelain Bushings
IS-7421/1976	Specification for Low voltage Bushings
IS-3347	Specification for Outdoor Bushings
IS-12444	Specification for Cu Wire rods
IS-5484	Specification for Al Wire rods
IS-5/1961 No. 632	Specification for Colors for ready mixed paints.
IS-6600/1972	Guide for loading of oil immersed Transformers.
IS-13947-Part 2	Low voltage switchgear and control gear.
IS-10028/1985	Code of Practice for Selection, Installation and Maintenance of Transformers.
IS-5 / 1994	Colours for ready mixed paints and enamels
IS-3618 / 1966	Specification for phosphate treatment of iron and steel for protection against corrosion
IEC Standard	**Title**
IEC 60296	Specification for unused and reclaimed mineral Insulating oil for transformer and switchgear.
IEC 60076	Specification for power transformer.
IEC 60076-1	General
IEC 60076-2	Specification for temperature rise requirement
IEC 60076-3	Specification for insulation levels and dielectric tests.
IEC 60076-4	Specification for tapping and connections
IEC 60076-5	Specification for ability to withstand short circuit
IEC 60551	Determination for transformer and reactor sound levels
IEC 60354	Guide to loading of oil immersed power transformer
IEC 60137	Insulated bushings for alternating voltage above 1kV

Other International and Internationally recognized star	Title
BS148, ASTM D-1275 D-1473, D-1533-1934	Specification for oil
DIN 42531 to 33	Specification for Outdoor Bushings
ASTM B-49	Specification for Cu Wire rods
ASTM B-233	Specification for Al Wire rods

Material conforming to other internationally accepted standards, which ensures equal or better quality than the standards mentioned above would be acceptable, subject to prior approval of Owner. In case the Bidders who wish to offer material conforming to the other standards, salient points of difference between the Standards adopted and the specific standards shall be clearly brought out in relevant schedule. Four copies of such standards with authentic English Translation shall be furnished along with the offer. In the case of conflict the order of precedence shall be 1) Indian Standards, 2) IEC Standards, 3) Other alternative standards.

APPENDIX-B

DRAWINGS SUBMITTAL REQUIREMENT OF THE SUPPLIER

Drawings, Data and Manuals shall be submitted with the bid and after the bid in quantities and procedures as specified in this specification for approval and subsequent distribution after the issue of Notice to proceed.

S.No	Description Of Drawing / Data / Manuals	With bid	Post bid	
		(2 sets of hard copies)	For review & approval (2 sets of hard copies)	Prior to Dispatch (2 sets of hard copies and 1 CD-ROM)
1	Completed technical data schedule;	Y		
2	Descriptive literature giving full technical details of equipment offered;	Y		

3	Outline dimension drawing for each major component, general arrangement drawing showing component layout and general schematic diagrams;	Y		
4	Type test certificates, where available, and sample routine test reports;	Y		
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;	Y		
6	Details of manufacturer's quality assurance programme and ISO 9000 series or equivalent national certification;	Y		
7	vii) Deviation from this specification. Only deviations approved in writing before award of contract shall be accepted	Y		
8	Recommended spare parts and consumable items for five years of operation with prices and spare parts catalogue with price list for future requirements	Y		
9	Quality Assurance Program	Y		
10	Programme for production and testing (A)		7	
11	Guaranteed Technical Particulars (A)		7	
12	General description of the equipment		7	

	and all components, including brochures (R)			
13	Calculations to substantiate choice of electrical, structural, mechanical component size/ratings (A)		7	
14	Detailed loading drawing to enable the buyer to design and construct foundations for the transformer(R)		7	
15	Transport / shipping dimensions with weight , wheel base details , untanking height etc. (R)		7	
16	Terminal arrangements and cable box		7	
17	Drawings of major components like Bushing, Ct etc. (A)		7	
18	List of makes of all fittings and accessories (A)		7	
19	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 (A)		7	
20	Detailed installation and commissioning instructions		7	
21	Quality Plan		7	
22	Inspection and test reports carried out in manufacturer's works (A)			Y
23	Test certificates of all bought out items			Y
24	Operation and maintenance Instruction as well as trouble shooting charts / manual			Y

Legend:

Y: The drawing / document is required from the supplier.

7: Within 7 days of LOI / PO / award of contract.

'A' → Means required for review and approval. 'R' → Means required for reference only.

NOTES:

1 The delivery period shall be reckoned from the date of placement of the order and not from the date of approval of drawings. Thus the delay in the submission of drawings for approval shall result in invoking the provisions of the penalty clause and the no. of days by which the delay has occurred shall be reckoned as delay in delivery. Accordingly it is the responsibility of the bidder to ensure that drawings are submitted within the stipulated number of days.

2 Two (2) sets of all drawings, data sheets shall be furnished in HARD COPY (with a forwarding letter, listing therein all the documents furnished for review / approval) to the Head – Engineering BSES. Drawing submittal by e-mail (soft copies) shall NOT be considered for review.

3 Accordingly the entire review / approval cycle shall be completed within 10 working days from the date of receipt of the first submittal from the supplier.

ANNEXURE- I

DATA SHEET OF CLIENT REQUIREMENT

1 Electrical System Data

Sl. No.	Continuous rated capacity	25 kVA	63 kVA	100 kVA
1	Location of equipment	Generally outdoor but may be located indoor also with poor ventilation		
1.1	Reference design ambient temperature	50^0C		
1.2	Type	Oil immersed, core type, step down		
1.3	Type of cooling	ONAN		
1.4	Tank	As per Clause no 3.4		
1.5	Reference standard	IS-1180 & IS: 2026		
1.6	No. of phases	3		
1.7	No. of windings per phase	2		
1.8	Rated voltage HV	11kV		
1.9	Highest System voltage –H.V	12kV		
1.10	Highest system voltage LV side	476 Volt		
1.11	HV system voltage variation	+/-10%		
1.12	Frequency variation	+/- 5%		
1.13	Combined voltage frequency variations	-20% or +10%		
1.14	Power frequency withstand voltage (kV rms) –H.V	28kV		
1.15	Impulse withstand voltage (kVpeak)- H.V	75kV (peak)		
1.16	Rated voltage LV	415 V		
1.17	Line current HV	1.31A	3.306A	5.25A
1.18	Line current LV	33.33A	84.0A	133.0 A
1.19	% Impedance (at 75°C)	4.5% with IS tolerance		
1.20	Guaranteed Total Losses			
1.21	Guaranteed Losses(no load +load losses at 75 °C) (watts) @ 50 % rated load	190	340	475

1.22	Guaranteed Losses(no load +load losses at 75 °C) (watts) @ 100 % rated load	635	1140	1650
1.22	No. of phases	Three		
1.23	Connection HV	Delta		
1.24	Connection LV	Star with Neutral brought out for external earth		
1.25	Vector Group reference	Dyn11		

1.26	No load voltage ratio	11kV/415V
1.27	Max. System fault level at HV Side	500 MVA
3	Short circuit Withstand capacity of the transformer	
3.1	Three phase dead short circuit at secondary terminal with rated voltage maintained on the other side	For 3 sec
3.2	Single phase short circuit at secondary terminal with rated voltage maintained on other side	For 3 sec
4	Noise Level	48/51/51 dB for 25, 63, 100 KVA transformers Respectively.
5	Power frequency withstand voltage kV rms	
5.1	Lighting impulse voltage for nominal system voltage of 11KV	75 KV
5.2	For nominal system voltage of 415V	3 KV
6	Clearances Phase to Phase in mm	
6.1	For nominal system voltage of 11KV	280MM.
6.2	For nominal system voltage of 415V	25 MM.
7	Clearances Phase to earth, Mm	
7.1	For nominal system voltage of 11KV	140 MM
7.2	For nominal system voltage of 415V	25 MM
8	System Fault Level, LV side	35MVA
9	HV	Solidly earthed
9.1	LV	Solidly earthed
10	Maximum overall dimension acceptable (Length x Width x height) mm x mm x mm	(1150 X 1010 X 1380) mm
11	Overload Capability	As per IS 6600
12	Radio Influence Voltage	Maximum 25 microvolt
13	Harmonic suppression	Transformer to be designed for suppression of 3rd, 5th, 7th harmonic voltages and high frequency disturbances.
14	Partial Discharge	Transformer to be free from partial discharge up to 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
15	Tapping's for 100kVA	Off circuit taps on HV winding, +2.5 to -5% in steps of 2.5%, change of taps by externally operated switch
16	Rotary tap switch operating voltage	11Kv
16.1	Rotary tap switch current rating Amp.	60AMP
17	Temperature rise over reference ambient of 50^0C	
17.1	Top oil by thermometer ^{0}C	35^0C
17.2	Winding by resistance ^{0}C	40^0C
18	Thickness of radiator tubes, Mm	Minimum 1.2mm
19	Details of Tank	
19.1	Material	Robust mild steel plate without pitting and low carbon content
19.2	Vacuum mm of Hg./ (kN/m2)	As per IS
19.3	Pressure mm of Hg.	
19.4	Is the tank lid sloped	Yes
20	Type	Core
20.1	Core material grade	Premium grade minimum M3
20.2	Insulation of lamination	With insulation coating on both sides
20.3	Design Flux density	1.6Tesla
21	Maximum flux density at 10%over excitation / over fluxing, Tesla	1.9Tesla
22	Conductor material	Copper for 100KVA Aluminum for 63KVA & 25KVA
22.1	Current density (HV/LV)	Maximum allowed 3.0 A per sqmm at all taps for CU winding Maximum allowed 1.5 A per sqmm at all taps for AL winding
23	Bushing / Support Insulator	
23.1	HV side Bushing /Support Insulator	12kV
23.2	LV side line and neutral bushing / Support Insulator	1.1kV

23.3	Creepage factor for all bushing / Support Insulator mm/KV	31 mm / kV
24	Rated thermal short time current	
24.1	HV bushing	25 times rated current for 2 secs
24.2	LV line and neutral bushing	25 times rated current for 2 secs
25	LV Cable termination arrangement	With LT cable box, (with O/G cable termination arrangement) For 25kVA & 63KVA Cable box shall have MCCB of appropriate rating with 25kA breaking current capacity Insulated bus bar.
25.1	Suitable for cable type, size	Outgoing LT cable of size up to 4C x150sqmm
25.2	Termination height, mm	As per cable box design
25.3	Gland Plate dimension, mm x mm	As per cable box design
25.4	Gland Plate material	MS / Aluminum
25.5	Gland Plate thickness, mm	5mm minimum
25.6	Phase to clearance inside box, mm	25 mm minimum
25.7	Phase to earth inside, mm	25 mm minimum
26	L.V neutral Cable termination arrangement	Additional LV Neutral shall be provided on LV Cable Box for direct earthing on separate pit.
27	Current Transformers	
27.1	Provision	ON all three phases on LV side
27.2	Mounting	On LV side bushing an all three phases with the help of fibre glass mounting plate affixed to main tank by nut bolt arrangement.
27.3	Maintenance requirements	Replacement should be possible by removing fixing nut of mounting plate after removal of LT cable without disturbing LT bushing.
27.4	Accuracy Class	0.5
27.5	Burden	5 VA
27.6	Type	Cast resin ring type suitable for outdoor use
27.7	CT ratio	200/5 for 100 KVA 100/5 for 25 to 63 KVA
27.8	CT terminal Box	
27.9	Size	As per vendor standard practice
27.11	No. of horizontal channels to be provided	Four
27.12	Fixing of terminals within the box	On horizontal slotted channel with the help of C channel available with the terminals
27.13	Location	On tank wall

27.14	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.
27.15	Terminal strip	Nylon 66 material, minimum 4 sq mm, screw type for control wiring and potential circuit.
27.16	Cable 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
27.17	Cable Glands	Nickel plated brass double compression weatherproof cable gland
27.18	Lugs on wires	Tinned copper pre insulated Pin, Ring, Fork type as applicable
27.19	Potential signal in CT box	Tapped from main LV bushing
27.20	Essential provision	Wiring diagram to be fixed on the back of door along with CT Sec. on Aluminum engraved plate fixed by rivet.
28	Terminal Blocks to be used by the vendor	Nylon 66 material, minimum 4 sq mm, screw type for control wiring and potential circuit. Terminal blocks to be located in such a way to achieve the termination height as min 250mm from gland plate.20%. Spare TBs to be provided
28.1	Essential provision for CT terminals	Sliding link type disconnecting terminal block screwdriver operated stud type with facility for CT terminal shorting material of housing melamine/Nylon66
29	Cable glands to be used by the vendor	Nickel plated brass double compression weatherproof cable gland
30	Painting of transformer, Radiator, cable boxes etc.	
30.1	Surface preparation	By 7 tank pre-treatment process or shot/ sand blasting method
30.2	Finish on internal surfaces of the transformer	Bright Yellow heat resistant and oil resistant paint two coats. Paint shall neither react nor dissolve in hot transformer insulating oil.
30.3	Finish on inner surface of the CT terminal box, HV/ LV/LVN cable box	White Polyurethane paint ant condensation type two coats, minimum dry film thickness 80 microns
30.4	Finish on outer surface of the transformer, radiator, CT terminal box, HV/LV/LVN cable box	Adminarly Grey shade 632 Polyurethane paint two coats, minimum dry film thickness 80 microns
30.5	Frame parts	Paint shade- 632 as per IS 5, with 80 microns (min.), Insulating oil resistant paint. Paint shall neither react nor dissolve in hot transformer insulating oil.

31	Fittings and Accessories on Transformer	
31.1	Rating and Diagram Plate	Required
31.2	Material	Anodized aluminum 16SWG

31.2	Background	SATIN SILVER
31.3	Letters, diagram & border	Black
32	Rating and Diagram Plate details	Following details shall be provided on rating and diagram plate as a minimum, requirement.
		i) type/kind of transformer with winding material
		ii) Standard to which it is manufactured
		iii) Manufacturer's name
		iv) Transformer serial number
		v) Month and year of manufacture
		vi) Rated frequency in HZ
		vii) Rated in kV
		viii) Number of phases
		ix) Rated power in kVA
		x) Type of cooling (ONAN)
		xi) rated currents in A
		xii) Vector group connection symbol
		xiii) 1.2/ 50 wave impulse voltage withstand level in kV
		xiv) Power frequency withstand voltage in kV
		xv) Impedance voltage at rated current and frequency in percentage at principal, minimum and maximum tap
		xvi) Max. Total losses at 50 % rated load & at 100% rated load
		xvii) No-load loss at rated voltage and frequency
		xviii) Continuous ambient temperature rise at rated load in deg C
		xix) Top oil and winding temperature rise at rated load in deg. C
		xx) Winding connection diagram with taps and table of tapping voltage, current and power
		xxi) Transport weight of transformer
		xxii) Energy efficiency level.
		xxiii) Weight of core
		xxiv) Weight of winding
		xxv) Weight of core and winding
		xxvi) Total weight
		xxvii) Volume of oi
		xxviii) Weight of oil

		xxix) Name of the Purchaser
		xxx) PO no and date
		xxxi) Guarantee period
33	Transformer oil	It should be in accordance with specification as per Annex III of this document 10% extra oil to be furnished in separate nonreturnable drum with each transformer

2 Transformer Requirements

Type of transformer	Conventional distribution transformer
Type of construction	Core type, Oil immersed
Type of cooling	Oil Natural Air Natural (ONAN)
No of phases	Three phase on primary & secondary side
No of windings	Two (one each for 3 phase primary & 3 phase secondary)
Type of service	Outdoor application
Type of mounting	Suitable for pole mounting, Double pole structure

The transformer shall be capable of withstanding the thermal and dynamic effects of short circuits, as specified in -"IEC 76-5: Ability to withstand short circuits" Each transformer shall be capable of withstanding for 3 seconds a bolted metallic short circuit on the terminals of either winding, with rated voltage on the other winding.

The transformers will be installed outdoor.

The transformers shall be capable of continuous operation of rated output under the operating conditions of voltage and frequency variations.

2 APPROVED MAKES OF COMPONENTS

3.1	CT	Pragati / ECS / Kappa/Narayan Powertech /Nortex/Adcon/Amity Electricals/Maxwell Gilbert
3.2	Bushings	Baroda Bushing/CJI/Jaipur/Genesis
3.3	Tap Changer	Alwaye /Paragon
3.4	MOG	Sukrut/Atvus
3.5	Valves	Newman
3.6	CRGO	Nippon/JFE/Posco/Thyssenkrupp
3.7	Copper	Birla copper/Sterlite
3.8	Pre compressed Pressboard	Raman Board, Mysore/ Senapathy Whiteley
3.9	Laminated Wood	Permalli Wallance / Rochling Engineers
3.10	Oil	Apar/Savita/Raj Petro/Gandhar/Columbia

3.11	Steel	TATA/Jindal/SAIL
3.12	Lugs/Glands	Jainson/Dowells/Comet
3.13	Radiators	CTR/Hi-Tech Radiators /Tarang Engineers
3.14	OTI and WTI	Precimeasure/Pecon

Note - Any other make of component shall be approved by BSES during Detailed Design Engineering

3 SERVICE CONDITIONS

3.1 Site Conditions

S.no.	Description	Details
1	Relative humidity	
	a) Maximum	100%
	b) Minimum	10%
2	Average annual rainfall	750mm
3	Average no. of rainy days	50 per annum
4	Temperature max/min/year average	50^0C / -5^0C/32^0C
5	Average no. of thunder storm days	40 per annum
6	Rain Months	June to October
7	Wind pressure	195 kg/m2 up to an elevation of 30 mt. As per IS:875/ 975

4 GENERAL PARTICULARS AND GUARANTEES

4.1 COMPLIANCE WITH SPECIFICATION

The transformers shall comply in all respects with the requirements of this specification. However, any minor deviations from the provisions of the specification shall be disclosed at the time of tendering.

4.2 COMPLIANCE WITH REGULATIONS

All the equipment shall comply in every respect with the Indian Regulations and acts in force.

The equipment and connections shall be designed and arranged to minimise the risk of fire and any damage which might be caused in the event of fire.

ANNEXURE II VENDOR DATA

(GURANTEED TECHNICAL PARTICULARS)

Note: This GTP is to be filled by the supplier in accordance with the given specification. Any deviation from the same shall be clearly highlighted and shall be supported with relevant documents.

S. No.	Description	UNIT	25kVA	63kVA	100kVA
1	Name of manufacturer				
2	Type				
3	Ratings				
(a)	Rated output	kVA			
(b)	Rated voltage-HV	Volts			
(C)	Rated voltage-LV	Volts			
(d)	No load voltage ratio				
(e)	Number of phases				
(f)	Frequency	Hz			
4	Connections				
(a)	High voltage				
(b)	Low voltage				
(c)	Vector group symbol				
5	Method of cooling				
6	Internal dimensions of tank				
(a)	Length	mm			
(b)	Breadth	mm			
(C)	Height	mm			
(d)	Thickness of tank sheet				
	i)Sides	mm			
	ii)Top	mm			
	iii)Bottom	mm			
7	Details of core				
(a)	Diameter	mm			
(b)	Cross sectional area				
	i) Gross	mm^2			
	ii)Net	mm^2			
(c)	Window height	mm			
(d)	Limb center	mm			
(e)	Maximum flux density at rated voltage and	Tesla			

	Frequency (to be supported by calculations)				
(f)	Material and thickness of lamination	mm			
(g)	Weight of stamping in core and yoke separately				
	i) Core	Kgs			
	ii)Yoke	Kgs			
	iii)Total	Kgs			
8	HV coil constructional details				
(a)	Type of winding	mm			
(b)	Size of conductor (Bare)	mm^2			
(C)	Cross sectional area of conductor				
	i) Gross				
	ii) Net				
(d)	Number of coils per limb				
(e)	Outer diameter of coil	mm			
(f)	Inner diameter of coil	mm			
(g)	Mean diameter of coil	mm			
(h)	Insulation of conductor				
(i)	Interlayer reinforcement detail				
(j)	Current at full load	Amp			
(k)	Normal working current density	Amp/ mm^2			
(l)	End turn insulation				
(m)	Weight of bare conductor used in one leg of HV	Kg			
(n)	Weight of insulated conductor used in one leg of HV	Kg			
(o)	Number of turns per leg				

(p)	Length of mean turns	mm			
(q)	**I^2R at 75^{O}C (To be supported by**				
	calculations)				
(r)	Axial length	mm			
(s)	Resistance per phase at **75^{O}C** (Max)	Ohms			
(t)	Weight of winding with insulation in one leg ofHV	Kg			
9	LV coil constructional details				
(a)	Type of winding				
(b)	Size of conductor (Bare)	mm			
(C)	Cross sectional area of conductor	mm^2			
	i) Gross				
	ii) Net				
(d)	Number of coils per limb				
(e)	Outer diameter of coil	mm			
(f)	Inner diameter of coil	mm			
(g)	Mean diameter of coil	mm			
(h)	Insulation of conductor				
(i)	Interlayer reinforcement detail				
(j)	Current at full load	Amp			
(k)	Normal working current density	Amp/ mm^2			
(l)	End turn insulation				
(m)	Weight of bare conductor used in one leg of LV	Kg			

(n)	Weight of insulated conductor used in one leg of LV	Kg			
(o)	Number of turns per leg				
(p)	Length of mean turns	mm			
(q)	**I^2R at 75°C (To be supported by calculations)**				

(r)	Axial length	mm			
(s)	Resistance per phase at **75°C** (Max)	Ohms			
(t)	Weight of winding with insulation in one leg of LV	Kg			
10	Insulation details material and size				
(a)	HV coil end packing				
(b)	LV coil end packing				
(C)	Inter coil spacer of HT sections				
(d)	Bottom core strip insulation				
(e)	Yoke insulation				
(f)	Clamp insulation				
(g)	Inter phase barrier				
(h)	Core wrap				
(i)	Cylindrical insulation between HT & LT				
(j)	Type of blocks used between coils				
11	Details of clearances				
(a)	Internal clearance between inner walls of tank and core coil assembly unit	mm			
	i) On length (Bushing side)				
	ii) On breadth (Non Bushing side)				

(b)	Radial clearance between LV and HV winding	mm			
(C)	Phase to phase clearance between HV limb	mm			
(d)	Clearance from top of the yoke to the inside of the top cover of tank	mm			
(e)	Radial clearance of LV coil from core	mm			
(f)	Horizontal duct				
	between HT sectional coil				
(g)	End clearance of HT coil from yoke	mm			
(h)	Minimum clearance between core and tank bottom	mm			
12	Impulse test voltage of winding for 1.2/50 micro seconds wave according to relevant ISS				
(a)	HV				
(b)	LV				
13	Volts per coil of HV winding	Volts			
14	Approximate volts per layer of HV winding	Volts			
15	Performance reference temperature	Deg. C			
16	No load loss at rated primary voltage and frequency.(Guaranteed value without any positive tolerance)	Watts			
17	Total losses				

17.1	Total losses(no load load losses at **75°C @ 50 % load)** (Guaranteed value without any positive tolerance)	Watts			
17.2	Total losses(no load load losses at **75°C @ 100 % load)** (Guaranteed value without any positive tolerance)				
18	Induced over voltage test at double frequency				
19 (a)	No load current at 100% rated voltage and rated frequency as percentage of full load current.				
(b)	No load current at 112.5% of rated voltage as percentage of full load current				
20	Regulation at normal full load and UPF at 75°C				
21	Regulation at normal full load and 0.8 Lag PF at 75°C				
22	Impedance voltage at rated voltage and frequency at 75°C	Volts			
23	Percentage reactance at rated voltage and frequency at **75°C**				
24	Percentage Resistance at **75°C**				
25	Percentage impedance at 75°C				

(a)	With respect to high voltage								
(b)	With respect to low voltage								
26	Unbalance current as percentage of full load current								
27	Percentage efficiency		At UPF	At 0.8 Lag PF		At UPF	At 0.8 Lag PF	At UPF	At 0.8 Lag PF
(a)	Full load								
(b)	¾ full load								
(c)	½ full load								
(d)	¼ full load								
28	Permissible duration of overload following continuous running at normal rated load in ambient temperature of 50°C								
(a)	10%overload								
(b)	20%overload								
(c)	30%overload								
29	RMS value of symmetrical short								

	circuit current which the transformer can withstand and its duration according to clause 9.1 of ISS-2026 or clause –1001 of BSS with latest Amendment.				
30	Increase in Temperature of winding at full load by resistance method in an ambient temperature of 50°C				
31	Increase in temperature of oil by thermometer at full load in an ambient				

	temperature of 50°C				
32	Temperature of hottest spot in the winding at full load in an ambient temperature of 50°C				
33	Terminal arrangement of HV side				
34	Terminal arrangement of LV side				
35	Particulars of HV bushing				
(a)	Name of manufacturer				
(b)	Type				
(c)	Dry withstand voltage for one minute				
(d)	Wet withstand voltage for thirty minutes				
(e)	Voltage rating				
(f)	Impulse withstand voltage 1.2/50 micro second wave				
	i)Positive				
	ii)Negative				
(g)	Total creepage distance in air	mm			
(h)	Height of bushing above transformer				

	tank				
36	Particulars of LV neutral bushing				
(a)	Name of manufacturer				
(b)	Type				
(c)	Voltage rating				
(d)	Dry withstand voltage for one minute				

(e)	Wet withstand voltage for thirty minutes				
(f)	Total creepage distance in air	mm			
(g)	Height of bushing above transformer tank	mm			
37	Time constant of transformer				
38	Transformer oil				
(a)	Dielectric strength				
(b)	Resistivity				
(c)	Acidity				
(d)	Tan delta				
(e)	Name of supplier				
39	Quantity of transformer oil	Litres			
40	Weight of the following				
(a)	Tank and fittings	Kgs			
(b)	Core and windings	Kgs			
(c)	Transformer oil	Kgs			
(d)	Total weight of transformer including oil	Kgs			
41	Overall dimensions of transformer				
(a)	Length	mm			
(b)	Breadth	mm			
(c)	Height	mm			
42	Name of material and size used for clamping of core winding				
(a)	Core clamp				
(b)	Tie rod				
(c)	Core bolt				

(d)	Bottom plate				
43	Size of conservator				
(a)	Volume				
(b)	Length/ diameter				
(c)	Sheet thickness				

44	Size of material of delta and line leads							
45	Core earthing material							
46	Silica gel breather							
	i)Make							
	ii)Size							
47	Clearance between phases and phases to earth in air							
(a)	Phase to phase(HV side)	mm						
(b)	Phase to phase (LV side)	mm						
(c)	HV to earth	mm						
(d)	LV to earth	mm						
48	Type testing							
(a)	Is the offered 11kV/415V, conventional distribution transformer type tested? (Yes, No)							
(b)	If yes, when and where was it type tested?							
(c)	Is there any deviation in the technical specification of offered 11kV/415V conventional type distribution transformer? If yes, give details.							
	Name of test	Date of test	Whether test report enclosed or not(Y/N)	If yes, No. of sheets enclosed	Whether test report enclosed or not(Y/N)	If yes, No. of sheets enclosed	Whether test report enclosed or not(Y/N)	If yes, No. of sheets enclosed

i)	Unbalance current Test							
ii)	Impulse voltage withstand test							
iii)	Temperature rise test							
iv)	Short circuit test							
v)	Thermal ability test							
vi)	Air pressure test							
49	Whether you will use specified aluminium alloy or brass copper with suitable bimetallic arrangement for HV/LV Connector							
50	Have you submitted drawing and calculation of cross sectional area of core?(Yes/No)							
51	Have you submitted calculation for computation of no load and load loss at 750Cas per design data of offered transformers? (Yes/No)							
52	Any other information							

ANNEXURE III
TRANSFORMER OIL

The insulating oil shall have following features :

S.No.	Item description	Specification requirement
1.1	Appearance of oil	Clear, free from sediment and suspended matter
1.2	Viscosity Max.	15 mm2 /s at 40°C 1800 mm2 /s at 0°C
1.3	Pour Point, Max	-10°C

1.4	Water content, Max	30 mg/Kg
1.5	Breakdown voltage	
i)	New unfiltered oil. Min.	30 kV
ii)	After filtration Min.	70 kV
1.6	Density Max.	0.895 g/ml at 20°C
1.7	Dielectric dissipation factor Max	0.005 at 90 °C,
1.8	Particle Content	Value to be provided by the vendor
1.9	Acidity Max	0.01 mg KOH/g
1.10	Interfacial tension at 27°C Min	40 mN/m
1.11	Total sulphur content	Value to be provided by the vendor
1.12	Corrosive sulfur	Not-corrosive
1.13	Potentially Corrosive sulfur	Not-corrosive
1.14	DBDS	Not detectable (<5 mg/kg)
1.15	Inhibitor	Not detectable (<0.01%)
1.16	Metal Passivator	Not detectable (<5 mg/kg)
1.17	Other additives	Type and concentration of additives to be provided by the vendor
1.18	2-furfural and related Compounds content	Not detectable (<0.05 mg/kg) for each individual compound
1.19	Oxidation stability	
a)	Total acidity, Max	1.2 mg KOH/g
b)	Sludge Max	0.8%
c)	DDF at 90 °C, Max	0.5
1.20	Gassing Tendency	Value to be provided by the vendor
1.21	ECT	Value to be provided by the vendor
1.22	Flash point Min.	135°C,
1.23	PCA content Max	3%
1.24	PCB content	Not detectable (<2 mg/Kg)

ANNEXURE-IV: CRGO & TESTING REQUIREMENT

In addition to the BSES specification following points to be verified during manufacturing/inspection (Valid for 100kVA DT only)	
1	Transformer core shall be low loss, non-ageing, high permeability PRIME GRADE CRGO with M3 Grade or better with max thickness of 0.23mm and with max core loss of 1W/Kg, perfectly insulated and clamped to minimize noise and vibrations.
2	Following stage inspections will be carried out by purchaser or by third party engineers appointed by BSES:
2.1	Reconciliation of mother coil by checking stamp & seal at factory before slitting. One sample of CRGO to be sealed for testing at CPRI/ERDA.
2.3	Following documents to be submitted during the stage inspection :
2.3.1	Invoice of supplier
2.3.2	Mills test certificates

2.3.3	Packing list
2.3.4	Bill of lading
2.3.5	Bill of entry certificates by customs
2.4	BSES may appoint recognized testing authority like CPRI /ERDA 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.
2.5	Bidder should have in-house NABL accredited testing facility. In case of unavailability of in house NABL accredited lab testing of bidder, one Transformer of each rating shall be randomly selected and sealed by BRPL representative for complete acceptance test as per IS -1180(including temperature test) at third party NABL Lab. Tests shall be conducted once per Rate contract at bidder's cost.

ANNEXURE-V: STANDARD BSES QAP (to be followed for testing/ inspection)

Amendment/Clarification Note against Technical Specification No: BSES-TS-62-TPDT-R0

S.No.	Clause No. of the technical specification	In addition to the BSES technical specification following points to be complied by Bidder:
1	New Clause	Age of CRGO shall not be more than 2 year old from the date of award of P.O.
2	New Clause	During execution of P.O., for any lot, incase vendor offers any alternate make of CRGO(from approved make list) which differs from make of CRGO supplied in earlier lot, complete test shall be conducted again at CPRI/ERDA by the vendor without any cost implication to BSES.
3	33	Supply of 10% extra transformer oil- Bidder need not to supply the same, clause waived off.
4	New Clause	Connection for DT meter to be tapped from LT main bus bar, same to be done through tinned copper thimbles.
5	New Clause	There should be no joint across breather pipe; it shall be fabricated using single piece of pipe.
6	3.5.2	Additional neutral bus bar 1. Size and type shall be same as per the main neutral bus bar. 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 up to 200 mm (minimum) below the gland plate.
7	2.0	Latest amendment of all national and international standards mentioned in the technical specification shall be applicable. For obsolete standards, replacement standards shall be applicable.
8	New Clause	Nut bolt arrangement at every joint shall include 2 Nos plain washers and 1 No. spring washer on all the Transformers before dispatch.
9	4.5.2	Detachable radiators with butterfly valves to be provided.
10	9.1.5	Oil testing shall be conducted once per lot at CPRI/ERDA. IS 1866-2017 table -3 and its latest amendment shall be applicable. For corrosive sulphur and DBDS (refer IS 1866-2017 table -3) -These tests shall be conducted at in-house NABL lab of OEM of transformer oil subject to availability of oil test report from CPRI/ERDA with OEM of transformer oil.
11	New clause	BEE star label shall be provided on each transformer (riveted). Protection against weather and dust shall be provided
12	New clause	For all the radiator sections Top radiator header level shall be below LT bushing level inorder to maintain oil circulation incase of oil leakage
13	New clause	**Material Receipt Inspection at BRPL Store / Workshop**-Testing (Electrical, mechanical and visual including BOM verification) at BRPL Store and workshop shall be conducted in presence of vendor representative at BRPL store; representative shall be present till all clearances for issuance of transformer have been provided by transformer workshop and store(refer Annexure A).
14	New clause	One set of inspection report corresponding to each transformer (considering individual transformer S No.) shall be provided inside of CT terminal box at the time of dispatch.
15	2.0	List of revised approved makes(refer Annexure B).

Prepared by	**Vani Sood**	01/07/26	**Rev : 00**
Checked by	**Pronab Bairagi**	1/7/26	
Reviewed by	**Anupam Kumar**	1/7/26	**No of Pages: 05**
Approved by	**Deepti Sharma**	1/7/2026	**Date : 01.07.2026**

Annexure-A: 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	Replace ment	OEM Works	BSES Store	OEM	BSES		
1	Oil leakage from radiator	X	√	√	X	√	X	• Pressure test • Oil Breakdown Voltage test (BDV) • Insulation Resistance test (IR)	Welding/M-seal/Putty etc. shall not be allowed
2	Oil leakage from tank top cover/ Conservator	√	√	√	√	√	X	• Pressure test • Oil Breakdown Voltage test (BDV) • Insulation Resistance test (IR)	Welding/M-seal/Putty etc shall not be allowed
3	Oil leakage from Tank body	√	√	√	√	√	X	• Pressure test • Oil Breakdown Voltage test (BDV) • 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 • Oil Breakdown Voltage test (BDV) • Insulation Resistance test	

01/7/26

Sl no	Type of defect in major categories	Action		Location		Responsibility		Required Tests/Checks	Remarks
		Repairing	Replace ment	OEM Works	BSES Store	OEM	BSES		
								(IR)	
6	Dent on Tank body (Minor)	√	√	√	√	√	X	• Magnetic Balance test • Ratio Test • Insulation Resistance test (IR) • No load test (LT Side supply)	
	Dent on Tank body (Major)	X	√	√	X	√	X	• Complete replacement of the tank • Complete test (Routine & acceptance) shall be conducted in accordance with Tech. Specification	
7	Wiring/ Connection	√	X	X	√	√	X	• Functionality test • High Voltage withstand test (2kV)	
8	Others	---						BSES decision shall be final	

Varun
01/7/26

Annexure-B Approved Makes List

This is in addition to the technical specification, for any component not mentioned in this list technical specification shall be followed

Item	Approved Makes as per BRPL Tech Specs
CT	Pragati / ECS / Kappa/Mehru/Continental/Nortex/**Adcon/Amity Electricals/Maxwell Gilbert / Kalpa/Pragathi/ Narayan Powertech**
Valves	Newman/Atam/ **Mahaveer/Hari Industries**
Aux Relay	GE/ **Ashida**
Bushings	Baroda Bushing/CJI/JP/**Genesis**
Tap Changer	Alwaye /Paragon/**Abhishek**
MOG	Sukrut/Atvus
CRGO	Nippon/JFE/Posco/Thysenkurup
Copper	Birla copper/Sterlite
Pre compressed Pressboard	Raman Board, Mysore/ Senapathy Whiteley
Laminated Wood	Permalli Wallance / Rochling Engineers
Oil	Apar/Savita/Raj Petro/ Gandhar/ **Columbia**
Steel	TATA/Jindal/SAIL
Lugs/Glands	Jainson/Dowells/Comet/**HEX/Braco/Ascon**
Radiators	CTR/Hi-Tech Radiators /Tarang Engineers/ **Sky Radiators /Sanjeev Industries /In House/SPI/ Lexmark**
WTI/OTI	Pecon/Precimeasure
MCCB	**ABB/L&T/Schneider/HPL/HAVELLS**
Fuse	**ERMCO/Trans Guard Electrical System**
Corrugated Tank	**MPP/BSES approved make/In House /Tashe**

Note –

1. All text in bold have been revised in this amendment
2. Any other make of component offered by the bidder during tender evolution stage, may be reviewed & approved by BSES.

01/07/96

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	

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								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**										

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								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	

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								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	

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								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	

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								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 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	

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								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**			

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								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	--	

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								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