



दूरभाष : 01437-220177
फैक्सनं. 91-01437-220163

भा.कृ.अ.प.—केन्द्रीय भेड़ एवं ऊन अनुसंधान संस्थान
अविकानगर, तह0 मालपुरा, जिला-टोंक (राजस्थान) – 304501

ICAR-Central Sheep & Wool Research Institute
Avikanagar, Teh.Malpura, Dist.Tonk (Rajasthan) – 304501



F.No. 1(387)SP/PAC/2017/V.III/

Dated: 03.10.2018

TENDER NOTICE

On behalf of Secretary, ICAR the Director, CSWRI, Avikanagar invites online bids in two bid system for purchase of Transformer 315 KVA & 500 KVA form reputed manufacturer firms and their authorized Dealers. Manual bids shall not be entertained.

Tender documents may be downloaded from e-Procurement website of CPP <https://eprocure.gov.in/> and www.cswri.res.in as per the schedule as given in CRITICAL DATE SHEET as under:

CRITICAL DATE SHEET

Tender No.	1(387)SP/PAC/2017/V.III/
Date and Time for issue/Publishing	03-10-2018 at 5.00 PM
Document Download/Sale start date and time	04-10-2018 at 11.00 AM
Pre Bid meeting	06-10-2018 at 11.00 AM
Bid Submission Start Date and Time	06-10-2018 at 11.00 AM
Bid Submission End Date and Time	29-10-2018 at 3.00 PM
Date and Time for Opening of Bids	30-10-2018 at 3.00 PM
Tender fee and Earnest money Security money	Tender fee – Rs.500/- Earnest money – @2% of Estimated cost Security money – 10 % of contract amount
Bank detail	ICAR UNIT -CSWRI, Avikanagar payable at SBI, MalpuraTonk Rajasthan
Address for Communication	Administrative Officer (S&P), C.S.W.R.I., Avikanagar, Malpura, Distt. Tonk, Rajasthan Pin- 304501

Chapter I- Instructions to bidders

- 1. Bids shall be submitted online only at CPPP website:** <https://eprocure.gov.in/eprocure/app>.
- Tenders/bidders are requested to visit website <https://eprocure.gov.in> regularly. Any changes/modifications in tender enquiry will be intimated by corrigendum through this website only.
- In case, any holiday is declared by the Government on the day of opening, the tenders will be opened on the next working day at the same time. The Institute reserves the right to accept or reject any or all the tenders.
- The complete bidding process is online. Bidders should be in possession of valid digital Signature Certificate (DSC) of class II or III for online submission of bids. Prior to bidding DSC needs to be registered on the website mentioned above. For any assistance for e-bidding process, if required, bidder may contact to the helpdesk at 01437-220177.
- Tenderer/Contractor/Bidders are advised to follow the instructions provided in the 'Instructions to the Contractors/Tenderer/Bidders for the e-submission of the bids online through the Central Public Procurement Portal for e-procurement at <https://eprocure.gov.in/eprocure/app>.**
- Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document.
- Tender Cost:** The interested Firms [except those who are registered with the Central Purchase Organization & National Small Industries Corporation (valid proof regarding exemption should be

enclosed mandatorily)] are required to deposit (in original) **Tender Fee of Rs.500/-** (Non-refundable) in the shape of Demand Draft prepared in favour of **ICAR UNIT – CSWRI, Avikanagar payable at SBI, MALPURA may be addressed to the Administrative Officer, C.S.W.R.I., Avikanagar, Malpura, Distt. Tonk, Rajasthan Pin- 304501** on or before bid opening date and time as mentioned in the Critical Date Sheet.

S. No.	Name of Item	Qty.	Approx. cost	Bid Security (EMD)
1.	Transformer 315 KVA	01	7,00,000/-	14,000/-
2.	Transformer 500 KVA	01	10,00,000/-	20,000/-

Note: All the bidders are requested to submit the copies of all the supporting documents separately, if they are participating in more than one equipment.

8. EMD Payment: The bidder shall be required to submit the Earnest Money Deposit (EMD) for an amount of **as shown in above table** by way of demand drafts or Bank Guarantee only. The demand drafts or Bank Guarantee shall be drawn in favour of “**ICAR Unit, CSWRI, Avikanagar, payable at SBI, Malpura**”. The EMD of the successful bidder will be converted to Security Money and for unsuccessful bidder(s) it would be returned after award of the contract. **The demand drafts or Bank Guarantee for EMD must deliver to ICAR-CSWRI, Avikanagar on or before last date / time of Bid Submission.**

- No request for transfer of any previous deposit of earnest money or security deposit on payment of any pending bill held by the institute in respect of any previous work will be entertained.
- Tenderer shall not be permitted to withdraw his offer or modify the terms and conditions thereof. In case the tenderer fails to observe and comply with stipulation made herein or back out after quoting the rates, the aforesaid amount of earnest money will be forfeited.
- The Tenders without Earnest Money will be summarily rejected.
- The Firm who are registered with National Small Industries Corporation (NSIC) / OR Small Scale Industries (SSI) are exempted to submit the EMD (Copy of registration must be provide along with technical bid)
- No Claim shall lie against the ICAR-CSWRI, Avikanagar in respect of erosion in the value or interest on the amount of EMD.

9. The Hard Copy of original document in respect of cost of tender document, earnest money deposit etc. must be delivered to the ICAR-CSWRI, Avikanagar on or before last date/time of Bid Submission as mentioned above. The bid without tender fee and EMD will be summarily rejected.

10. Submission of Tender: The tender shall be submitted online in two part, viz., technical bid and financial bid. All the pages of bid being submitted must be signed and sequentially numbered by the bidder irrespective of nature of content of the documents before uploading.

The offers submitted by Telegram/Fax/Email shall not be considered. No correspondence will be entertained in this matter.

- The successful firm shall have to supply the item (from the date of confirmed supply order) within 45 days or as mentioned in the supply order and if the materials are not supplied and installed in time then EMD shall be forfeited. The rates quoted shall be valid for 180 days from the date of opening of tender.
- The bidders or his representative may contact the undersigned at Tel No.01437-220177 for any further clarification on any working day between 9.30 AM to 5.00 PM. No variation in terms of quality of the items shall be entertained or else EMD/Security deposit shall be forfeited.
- Merely quoting of lowest rates does not mean that order shall be given to that firm. The competent authority will finally decide on the basis of quality & performance of past installations.
- The Institute is exempted from payment of excise duty/Custom duty. Hence, excise duty/custom will not be paid to the firm.
- Bidders need not be come at the time of Technical as well as financial bid opening at ICAR-CSWRI, Avikanagar. They can view live bid opening after login on CPP e-Procurement Portal at their remote end, If bidder wants to join bid opening event at ICAR-CSWRI, Avikanagar, then they have to come with bid acknowledgement slip that generates after successfully submission of online bid.
- Technical Bid :** The following scanned documents are to be furnished by the bidders along with Technical Bid as per the tender document:
 - Scanned copy of valid relevant Firm Registration certificate
 - Scanned copy of Pan Card and GST No.

3. Scanned copy of Questionnaire
 4. Scanned copy of ink signed with seal tender specific authorization from OEM or authorized supplier/dealer of foreign firm
 5. Scanned copy of latest ITR
 6. Scanned copy of User list/purchase order of its satisfactory installation
 7. Scanned copy of Make and Model of all systems, sub systems and additional items which are quoted should be mentioned in the technical details should be provided in the form of Brochures.
 8. Scanned copy of D.D. of Tender Fee & E.M.D.
 9. Scanned copy of Tender acceptance letter (as per Annexure I)
 10. Scanned copy of Price Justification Certificate (as per Annexure II)
 11. Scanned copy of No Deviation Certificate - (as per Annexure III)
 12. Scanned copy of non-blacklisting certificate (as per Annexure IV)
 13. Scanned copy of technical specification or compliance report (as per Annexure V to VIII).
 14. Scanned copy of Inspection reports issued by govt. of India authorised labs for all tests mentioned in the technical specification for each transformer.
- 17. Price Bid :** Price to be quoted for Destination CSWRI, Avikanagar including all taxes, levies, installation, testing, commissioning and related activities charges, etc. in the attached BOQ in xls. format only. No other price schedule in any other format will be entertained.

All necessary documents in support of the details for S.No. 1 to 14 must accompany the technical bid. The bid is liable to be rejected in case documents are not uploaded in the technical bid on CPP Portal, documents are incomplete or in case any certification/registration has already expired but is yet to be renewed. Only essential and necessary valid documents are to be uploaded in the technical bid. Please avoid uploading extraneous and irrelevant documents which unnecessary cause confusion.

Administrative Officer

SDB No.- _____

**ICAR-CENTRAL SHEEP & WOOL RESEARCH INSTITUTE
AVIKANAGAR TEHSIL MALPURA 304501 (RAJASTHAN)**

F.No.- 1 (719) SP/2018/

Date : 03.10.2018

**STANDARD BIDDING DOCUMENT FOR ICAR
FOR PURCHASE GOODS**

For High Value Purchase/
Contract

- | | |
|---|-------------------------------|
| 1. Address of Manufacturer/Suppliers | M/s _____

_____ |
| 2. Name of goods for which issued | Transformer 315 KVA & 500 KVA |
| 3. Item No. | 1 |
| 4. Tender Fee | Rs. 500/- |
| 5. Bid Security/ EMD | As mentioned in table |
| 6. Deadline for Submission of Bid is up to 3.00 p.m. on | 29.10.2018 |
| 7. Time and date of Bid Opening at 3:00 p.m. on | 30.10.2018 |

SIGNATURE

ICAR-CENTRAL SHEEP & WOOL RESEARCH INSTITUTE

Avikanagar Tehsil Malpura Distt. Tonk (Rajasthan) 304501

BIDDING DOUCMENTS FOR PURCHASE OF GOODS

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Avikanagar Tehsil Malpura Distt. Tonk (Rajasthan) 304501

SECTION II- INSTRUCTION TO BIDDERS (ITB)

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ICAR-CENTRAL SHEEP & WOOL RESEARCH INSTITUTE
Avikanagar Tehsil Malpura Distt. Tonk (Rajasthan) 304501
INSTRUCTION TO BIDDERS (ITB)

A. INTRODUCTION

1. Source of funds

1.1 The expenditure to be incurred for this intended purchase will be met from the funds available with the purchaser named in the Schedule of requirements, hereinafter referred to as “the purchaser”.

2. Eligible bidders

2.1 This invitation for bids is open to all suppliers, who fulfil the eligibility criteria as well as the qualification criteria incorporated in this document.

3. Cost of bidding

3.1 The bidder shall bear all costs associated with the preparation and submission of its bid including samples, drawings, literatures etc., if any. The purchaser will in no case be responsible or liable any such cost, regardless of the conduct or outcome of the bidding process.

B. THE BIDDING DOCUMENTS

4. Content of bidding documents

4.1 The goods required, bidding, procedures and contract terms are prescribed in the bidding documents. In addition to the invitation for Bids, the bidding documents include.

- a. Instruction to Bidders (ITB).
- b. General Conditions of Contract (GCC)
- c. Schedule of Requirements
- d. Technical specification and Quality Control Requirements
- e. Questionnaire
- f. Bid Form and BOQs
- g. Bank Guarantee Form for Bid Security.
- h. Manufacturers Authorization Form
- i. Bank Guarantee Form for Performance Security.
- j. Contract Form

4.2 In case of any contradiction between the stipulations made in ITB & GCC and Schedule of Requirements, the stipulations incorporated in the Schedule of Requirements will prevail over the corresponding stipulation contained in the ITB and/or GCC.

4.3 The bidder is expected to examine all instructions, forms, terms and specifications in the bidding documents. 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 be at the bidders risk and may result in rejection of its bid.

5. Clarification of bidding documents

5.1 A prospective bidder requiring any clarification in connection with the bidding documents may notify the purchaser in writing or by mail at the purchaser’s mailing address indicated in the **Schedule of Requirements**. The purchaser will respond in writing to any request for clarification of bidding documents which it receives no later than 15 (fifteen) days prior to the deadline for submission of bids prescribed by the purchaser. The purchaser, at its discretion, may send the relevant text of this correspondence (without identifying the source of inquiry) to all the prospective bidders, which have received the bidding documents.

6. Amendment of bidding documents

6.1 At any time prior to the deadline for submission of bids, the purchaser may, for reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the bidding documents by amendment.

6.2 The amendment will be through corrigendum uploaded on CPP Portal which will be notified to all prospective bidders. All such amendment or corrigendum will be binding on all the bidders.

6.3 In order to provide the prospective bidders with 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 and other allied time frame having linkage with that deadline.

C. PREPARATION OF BIDS

7. Language of bid

7.1 The bid submitted by the bidder and all correspondence and documents relating to the bid exchanged by the bidder and the purchaser, shall be written in English Language, Supporting documents and printed literature furnished by the bidder may be written in other languages, provided they are accompanied by an English translation of their relevant passages in which case, for the purpose of interpretation of the bid, the English translation shall govern.

7.2 The bid submitted by the bidder and all correspondence and documents relating to the bid exchanged by the bidder and the purchaser, may also be written in Hindi language, provided that the same is accompanied by an English translation, in which case, for the purpose of interpretation of the bid, the English translation shall govern.

8. Document constituting the bid

- 8.1 The bid submitted by the bidder shall comprise of the following documents.
- a bid form and a BOQ in accordance with ITB clauses 9,10 and 11.
 - Documentary evidence established in accordance with ITB clause 13 that the bidder is eligible to bid and is qualified to perform the contract if its bid is accepted.
 - Documentary evidence established in accordance with ITB clause 14 that the goods and ancillary services to **be supplied by the bidder conform to the bidding documents**
 - Bid security furnished in accordance with ITB clause 15.
 - The questionnaires (attached with the bidding documents) duly filled in.

NOTE: A bid which does not fulfill any of the above requirements and/or gives evasive information/reply against any such requirement shall be liable to be declared unresponsive and summarily rejected.

9. Bid Form

- 9.1 The bidder shall complete the bid form and the appropriate BOQ furnished in the bidding documents in section VII/1, indicating, inter alia, for the goods to be supplied, a brief description of the goods, their country of origin, quantity and prices.

10. Bid prices (Rate should be quoted for F.O.R. CSWRI Avikanagar in INR in BOQ in xls. format only)

- The ICAR Research Institutes are exempt from Excise and Customs Duties on Research Consumables, vide Notification No. 10/97-CE dated 01.03.1987 (as amended by 16/07-CE) and Notification No. 51/96-Customs respectively.** However, for the ICAR Institutes to avail the aforesaid Duty Exemption benefits, the Prices are required to be quoted by Manufacturers preferably on FOR basis, without including any Excise/Customs Duty component.
 - Alternatively, however, the Authorized Dealers/Retailers may quote their most competitive FOR prices, with maximum possible Dealer's Special Discount.
 - The rates and prices quoted shall be in Indian Rupees only.
 - All duties, taxes and levies payable by the supplier under the contract shall be included in the quoted price. The purchaser will not pay any such duties, taxes and levies separately. However, ICAR-CSWRI, Avikanagar is registered with DSIR, therefore, eligible for GST on concessional rate as per GOI GST Notification/s 47/2017-Integrated Tax (Rate) and 45/2017-Central Tax (Rate) dated 14.11.2017.** GST as legally and contractually liveable will be quoted separately by indicating the nature and the current rate of GST, as applicable at the time of quoting. The GST will be paid extra at actual at the time of supply, provided the transaction of sale is legally liable to the amount of the GST is contractually payable. If the supplier in its quotation does not ask for GST extra, the same shall not be paid even if it asks for the same at a later date.
 - The rates and prices quoted by the supplier shall remain firm and fixed during the currency of the contract and shall not be subject to variation on any account, whatsoever, including statutory variations, if any. "However, GST will be paid extra as per provision under Clause 10 (d) above"
- 10.1 The Bidder shall indicate on the BOQ the unit price and total bid prices of the goods it proposes to supply under the Contract. To this end, the Bidders are allowed the option to submit the bids for any one or more schedule specified in the 'Schedule of Requirement' and to offer discounts for combined schedules. **However, Bidders shall quote for the complete requirement of goods and services specified under each schedule on a single responsibility basis, failing which such bids (for the schedule in question) will not be taken into account for evaluation and will not be considered for award.**
- 10.2 Prices indicated on the BOQ shall be entered separately in the following manner. (If applicable)
- I. for goods offered from within India**
- ~~the price of the goods, quoted FOR destination i.e. CSWRI, Avikanagar only. ex-factory, ex-showroom, ex-warehouse or off the shelf. taxes already paid or payable on the components and raw materials used in the manufacture or assembly of the~~
 - Any sales or other taxes/duties including excise duty, which will be payable on the goods in India if the contract is awarded. to delivery of goods to their final destination. The final destination is specified in the **schedule of requirements** and the price of incidental services as and if listed in **Schedule of Requirements**.
 - Any element of cost, taxes, duties levies etc. not specifically indicated in the bid, shall not be paid by the purchaser.
- II**
- ~~the~~ **if specified in the Schedule of Requirements. In quoting the prices, the bidder shall use ocean transportation**
India is a member country. Similarly, the bidder may obtain insurance services from any nationalized
 - The price of goods shall be quoted FOB port of shipment, as and if specified in the **Schedule of**
 - ~~Charges for inland transportation, insurance and other local costs incidental to delivery of the goods from the~~
and

- d) _____
- e) ~~Any element of cost, taxes, duties, levies etc. not specifically indicated in the bid, shall not be paid by the~~
- ~~10:3 The terms FOB, CIF, CIP etc. shall be governed by the rules & regulations prescribed in the current edition of~~
- ~~10:4 The bidder's separation of the price components in accordance with ITB clause 10.2 above will be solely for~~
- ~~right to contract on any of the terms offered.~~
- ~~10.5 subject to variation on any account, unless otherwise specified in the Schedule of Requirements. If the~~
- ~~responsive and rejected, pursuant to ITB clause 23.~~
- 11 Bid currencies (The prices to be quoted in INR only)**
- 11.1 For domestic goods prices shall be quoted in Indian rupees only. Commission for Indian Agent, if payable, shall also be quoted in Indian Rupees only in a manner as specified in ITB Clause No.12.2. For imported goods prices shall be quoted in Indian currency.
12. **Indian Agent** (If applicable)
If a foreign bidder has engaged an agent in India in connection with its bid it will be required to give the following information in the bid:
- i) the name and address of the Indian agent with their permanent income tax number.
 - ii) The details of the services the agent will render.
 - iii) the amount of remuneration for the agent, included in the FOR component of the bid price.
- 12.1 The agency commission shall be indicated in the space provided for in the price schedule and will be paid to the bidder's agent in Indian rupees using the telegraphic transfer buying rate of exchange ruling on the date of award of contract and shall not be subject to any further exchange variation.
13. **Documents establishing bidder's eligibility and qualifications**
- 13.1 Pursuant to ITB clause 8, the bidder shall furnish, as part of its bid, documents establishing the bidder's eligibility to bid and its qualifications to perform the contract if its bid is accepted.
- 13.2 The documentary evidence of the bidder's qualifications to perform the contract if its bid is accepted, shall establish to the purchaser's satisfaction:
- a) that, in the case of bidder offering to supply goods under the contract which the bidder did not manufacture or otherwise produce, the bidder has been duly authorized (as per authorization form in section VII/3) by the good's manufacturer or producer to supply the goods in India. **The Authorization Certificate should be from the "Manufacturer" only and certificate from any other firm/person including OEM arrangements would be not be accepted.**
 - b) That the bidder has financial, technical and production capability necessary to perform the contract and, also, it meets the criteria indicated in the Schedule of Requirements.
 - c) that, in the case of bidder not doing business in India, the bidder is or will be (if successful) represented by an agent in India equipped and able to carry out the supplier's maintenance, repair and spare parts stocking obligations prescribed by the conditions of contract and/or technical specifications.
 - d) that such an agent (w.r.to sub-para c above) is enlisted with Directorate General of Supplies & Disposals, Jeevan Tara Building, Sansad Marg, New Delhi-110 001, under the scheme of Ministry of Finance, Govt. of India for compulsory enlistment of Indian Agents.
 - e) If an agent in its bid submits quotations on behalf of more than one manufacturer, it is necessary that each such bid is accompanied by a separate bid form and bid security for each such quotation and authorization from the respective manufacturer (as per authorization form in section VII/3). Otherwise all such quotations will be rejected as non-responsive.
14. **Documents establishing good's eligibility and conformity to bidding document.**
- 14.1 Pursuant to clause 8, the bidder shall furnish, as part of its bid, documents establishing the eligibility and conformity to the bidding documents of all goods and services which the bidder proposes to supply under the contract.
- 14.2 The documentary evidence for eligibility of the goods and services shall consist of a statement in the BOQ, about the country of origin of the goods and services offered which shall be confirmed by a certificate of origin issued at the time of shipment.
- 14.3 The documentary evidence of conformity of the goods and services to the bidding documents may be in the form of literature, drawings, data etc. and shall consists of:
- a) A detailed description of the goods, essential technical and performance characteristics.
 - b) A list giving full particulars, including available sources and current prices, of all spare parts, special tools, etc., necessary for the proper and continuing functioning of the goods for a period of two years (or more, if specified in the schedule) following commencement of the use of the goods by the purchaser; and
 - c) A clause – by- clause commentary on the purchaser's "Technical Specifications" demonstrating

- substantial responsiveness of the goods and services to those specifications or a statement of deviations and exceptions to the provisions of the 'Technical specifications'.
- 14.4 For purposes of the commentary to be furnished to ITB clause 14.3 c above, the bidder shall note that the standards of workmanship, material and equipment and reference to brand names or catalogue numbers, if any designated by the purchaser in its 'Technical Specifications' are intended to be descriptive only and not restrictive. The bidder may substitute alternative standards, brand names and/or catalogue numbers in its bid, provided that it demonstrates to the purchaser's satisfaction that the substitutions are substantially equivalent or superior to those mentioned in the 'Technical Specifications'.
- 15. Bid Security**
- 15.1 Pursuant to clause 8, the **bidder shall furnish as part of its bid, a bid security of an amount specified in the Schedule of Requirements.**
- 15.2 The bid security is required to protect the purchaser against risk of bidder's conduct, which would warrant the security's forfeiture, pursuant to ITB clause 15.8.
- 15.3 Exemption and benefits will be provided to MSMEs as per MSME Act 2006 and subsequent GOI instructions**
- 15.4 The bid security shall be denominated in Indian Rupees and shall be in one of the following forms:
- Demand draft on a scheduled commercial bank in India, drawn in favour of the designated officer of the purchase organization and payable at a place as indicated by the purchaser in the **Schedule of Requirements.**
 - A bank guarantee, issued by a scheduled commercial bank in India or a bank abroad, duly confirmed by a scheduled commercial bank in India in the form provided in the bidding documents under section VII/2 and valid for 45 days beyond the validity of the bid.
 - FDR on a scheduled commercial bank in India, drawn in favour of the designated officer of the purchase organization and payable at a place as indicated by the purchaser in the **Schedule of Requirements.**
- 15.4 Any bid from a bidder, not secured in accordance with ITB clauses 15.1 and 15.4 will be summarily rejected by the purchaser, as non-responsive, pursuant to ITB clause 24.
- 15.6 Unsuccessful bidders' bid security will be discharged/returned as promptly as possible after the expiration of the period of bid validity prescribed by the purchaser, pursuant to ITB clause 16, but, barring any unforeseen circumstances, not later than 45 days of the award of contract.
- 15.7 The successful bidder's bid security will be discharged/returned upon the bidder, signing and accepting the contract pursuant to ITB clause 33 and furnished the performance security, pursuant to ITB clause 34.
- 15.8 The bid security may be forfeited. **a. If a bidder:**
- Withdraws its bid or impairs or derogates from the bid in any respect during the period of bid validity specified by the bidder on the bid form;
- Or
- does not accept the correction of errors pursuant to ITB clause 24.2
- b. in the case of successful bidder, if the bidder fails:**
- to accept and sign the contract in accordance with ITB clause 33.
 - to furnish performance security in accordance with ITB clause 34.
- 16. Period of validity of bids**
- Bids shall remain valid for acceptance for 180 (one hundred eighty) days after the date of bid submission prescribed by the purchase, pursuant to ITB clause 19.
- 16.1 In exceptional circumstances, the purchaser may solicit the bidder's consent to an extension of the period of bid validity up to a specified period. The request and the response thereto shall be made in writing (or by e-mail, which will be followed by a signed confirmatory copy simultaneously). The bid security provided under ITB clause 15 shall also be suitably, extended. A bidder may refuse the request without forfeiting its bid security. However, a bidder agreeing to the request will not be required nor permitted to modify its bid.
- 16.2 If the date up to which the bid is to remain valid happens to be a closed holiday for the purchaser, the bid shall automatically remain valid up to the next working day of that organization.
- 17. Signing of bid (Bid shall be signed electronically using digital signature)**
- 17.1 ~~Bid² respectively. In the event of any discrepancy between them, the original shall govern.~~

D. Instructions for Online Bid Submission

18. The bidders are required to submit soft copies of their bids electronically on the CPP Portal, using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal. More information useful for submitting online bids on the CPP Portal may be obtained at: <https://eprocure.gov.in/eprocure/app>.
- 19. REGISTRATION**
- Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal (URL: <https://eprocure.gov.in/eprocure/app>) by clicking on the link "Online bidder Enrollment" on the CPP Portal which is free of charge.

- b) As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.
- c) Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal.
- d) Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (Class II or Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify / nCode / eMudhra etc.), with their profile.
- e) Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSC's to others which may lead to misuse.
- f) Bidder then logs in to the site through the secured log-in by entering their user ID / password and the password of the DSC / e-Token.

19.1 SEARCHING FOR TENDER DOCUMENTS

- a) There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, Organization Name, Location, Date, Value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as Organization Name, Form of Contract, Location, Date, Other keywords etc. to search for a tender published on the CPP Portal.
- b) Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective „My Tenders“ folder. This would enable the CPP Portal to intimate the bidders through SMS / e-mail in case there is any corrigendum issued to the tender document.
- c) The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.

19.2 PREPARATION OF BIDS

- a) Bidder should take into account any corrigendum published on the tender document before submitting their bids.
- b) Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents - including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.
- c) Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document / schedule and generally, they can be in PDF / XLS / RAR / DWF/JPG formats. Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document.
- d) To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents (e.g. PAN card copy, annual reports, auditor certificates etc.) has been provided to the bidders. Bidders can use “My Space” or „Other Important Documents“ area available to them to upload such documents. These documents may be directly submitted from the “My Space” area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.

20. SUBMISSION OF BIDS

- a) Bidder should log into the site well in advance for bid submission so that they can upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other issues.
- b) The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.
- c) Bidder has to select the payment option as “offline” to pay the tender fee / EMD as applicable and enter details of the instrument.
- d) Bidder should prepare the EMD as per the instructions specified in the tender document. The original should be posted/couriered/given in person to the concerned official, latest by the last date of bid submission or as specified in the tender documents. The details of the DD/any other accepted instrument, physically sent, should tally with the details available in the scanned copy and the data entered during bid submission time. Otherwise the uploaded bid will be rejected.
- e) Bidders are requested to note that they should necessarily submit their financial bids in the format provided and no other format is acceptable. If the price bid has been given as a standard BoQ format with the tender document, then the same is to be downloaded and to be filled by all the bidders. Bidders are required to download the BoQ file, open it and complete the white coloured (unprotected) cells with their respective financial quotes and other details (such as name of the bidder). No other cells should be changed. Once the details have been completed, the bidder should save it and submit it online, without changing the filename. If the BoQ file is found to be modified by the bidder, the bid will be rejected.
- f) The server time (which is displayed on the bidders“ dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission.
- g) All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of

- bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128 bit encryption technology. Data storage encryption of sensitive fields is done. Any bid document that is uploaded to the server is subjected to symmetric encryption using a system generated symmetric key. Further this key is subjected to asymmetric encryption using buyers/bid openers public keys. Overall, the uploaded tender documents become readable only after the tender opening by the authorized bid openers.
- h) The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
 - i) Upon the successful and timely submission of bids (i.e. after Clicking “Freeze Bid Submission” in the portal), the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.
 - j) The bid summary has to be printed and kept as an acknowledgement of the submission of the bid. This acknowledgement may be used as an entry pass for any bid opening meetings.

21 ASSISTANCE TO BIDDERS

- a) Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender.
- b) Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24x7 CPP Portal Helpdesk.

E. BID OPENING AND BID EVALUATION

- 22. Bidders need not come at the time of Technical as well as financial bid opening at ICAR-CSWRI, Avikanagar. They can view live bid opening after login on e-Procurement Portal at their remote end, If bidder wants to join bid opening event at ICAR-CSWRI, Avikanagar then they have to come with bid acknowledge slip that generates after successful submission of online bid.
- 22.1 The interested Firms are required to deposit (in original) **Tender Fee of Rs.500/-** (Non-refundable) in the shape of Demand Draft prepared in favour of **ICAR UNIT -CSWRI, Avikanagar payable at SBI, MALPURA may be addressed to the Administrative Officer, C.S.W.R.I., Avikanagar, Malpura, Distt. Tonk, Rajasthan Pin- 304501** on or before bid opening date and time as mentioned in the Critical Date Sheet.
- 22.2 The interested Firms are required to deposit (in original) and Earnest Money Deposit (EMD) of the amount mentioned against item in the form of Demand Draft/FDR from any of the Nationalised Bank **in favour of ICAR UNIT -CSWRI, Avikanagar payable at SBI, MALPURA** may be addressed to the Administrative Officer, C.S.W.R.I., Avikanagar, Malpura, Distt. Tonk, Rajasthan Pin- 304501 on or before bid opening date and time as mentioned in the Critical Date Sheet.
- 22.3 The firm should send the Original brochures of the product and may be addressed to the **Administrative Officer (Store & Purchase), CSWRI, Avikanagar, Malpura, Distt. Tonk, Rajasthan Pin- 304501 on or before bid opening date and time as mentioned in the Critical Date Sheet.**
- 23. **Preliminary examination of bids-unresponsive, substantially responsive & responsive bids will be done.**
- 24. All such bids received without hard copies of EMD, Tender Fee and required document/samples/brouchers etc. before the date of tender opening will be considered non-responsive.
- 24.1 The purchaser will examine the bids to determine whether they are complete, whether the required bid validity is available, whether any computational error have been made, whether required bid Security has been furnished, whether the documents have been properly signed, and whether the bids are generally in order. While examining the bids, the purchaser will also keep in view the requirements as per ITB Clause 8.
- 24.2 Prior to the detailed evaluation pursuant to ITB clause 26, the purchaser will determine the substantial Responsiveness of each bid to the bidding documents. A substantially responsive bid is one which conforms to all the requirements and terms & conditions of the bidding documents, including the specification and technical parameters of the goods as projected in the bidding document, without material deviations. Deviations from or objections or reservations to the bidding documents critical provisions, such as those concerning bid validity, technical specification, performance security, warranty obligations, Force Majeure, taxes & duties and applicable law (governing the contract) will be deemed to be material deviations. Bids from an agent without proper authorization from the manufacturer as per ITB clause 13.2(a), shall be treated as non-responsive. The purchaser’s determination of a bid’s responsiveness is to be based on the contents of the bid itself without recourse to extrinsic evidence.
- 24.3 The purchaser may waive any minor infirmity, non-conformity or irregularity in a bid, which does not constitute a material deviation, provided such waiver does not prejudice or affect the relative ranking of any bidder.
- 24.4 The conclusion drawn by the purchaser as to the substantial responsiveness or otherwise of a bid or consideration of a minor infirmity or non-conformity or irregularity in a bid is final.
- 24.5 If a bid is determined as not substantially responsive, it will be rejected by the purchaser and may not subsequently be made responsive by the bidder by correction of the non-conformity.

25. _____

~~25.1 To facilitate evaluation and comparison of bids, the purchaser will comparison of bids, the purchaser will Indian rupees at the BC selling market rate of exchange established by the State Bank Of India for similar~~

26. Evaluation and comparison of bids

26.1 The purchaser will evaluate and compare the bids, which have been determined to be substantially responsive, pursuant to ITB clause 24 for each **schedule separately**. The bid for a schedule will not be considered if the complete requirements covered in the schedule is not included in the bid. However, as stated in ITB clause 10, bidders are allowed the option to bid for any one or more schedule and to offer discounts for combined schedules. These discounts will be taken into account in the evaluation of the bids so as to determine the bid or combination of bids offering the lowest evaluated cost for the purchaser in deciding award(s) for each schedule.

~~26.2 The comparison shall be on CIP destination basis, duly delivered and commissioned (as the case may be) at~~

26.3 The purchaser's evaluation of a bid will include and take into account, in addition to bid price and price of the incidental services:

- a) In the case of goods manufactured in India or goods of foreign origin already located in India, sales tax & other similar taxes and excise duty & other similar duties, which will be payable on the goods if a contract is awarded to the bidder.
- b) In case of goods of foreign origin offered from abroad, customs duties and other similar import duties/taxes, which will be payable on the goods if the contract is awarded to the bidder.

26.4 The purchaser's evaluation of bid will also take in to account the following factors in the manner and to the extend specified in the **Schedule of Requirements** and amplified in ITB clause 26.5:

- a. Cost of inland transportation, insurance and other costs within India incidental to delivery of the goods to their final destination as stipulated in the Schedule of Requirements.
- b. Delivery schedule offered in the bid,
- c. the cost of components, spare parts and service,
- d. the availability of spare parts and after-sale service in India for the goods offered in the bid.
- e. The projected operating and maintenance cost during the life of the equipment.
- f. Specific additional criteria.

26.5 Pursuant to clause 26.4, following evaluation methods will be followed:

a) ~~Inland transportation, insurance and incidentals:~~

~~required destination as already indicated in the Schedule of Requirements. These Costs, incurred in India, shall~~

b) Delivery Schedule:

The purchaser requires that the goods mentioned in the 'Schedule of Requirements' shall be delivered at the destination within the time schedule specified therein. As and if necessary, the estimated time of arrival of goods from ex-works/port of entry to the destination will be calculated by the purchaser for each bid after allowing for reasonable transportation time based on the published tariff of Railways, appropriate Road Transport Agencies etc. Bids offering deliveries (as worked out on above lines), which are later than the specified delivery but within the allowable range (as specified in the Schedule of Requirements) will be adjusted during the evaluation by adding a factor equal to the percentage specified in the Schedule of Requirements, to the EXW/CIF/CIP price per week of variation from the specified delivery schedule.

c) Cost of components and spare parts:

- i) the list of items and quantities of major assemblies, components and selected spare parts, likely to be required during the initial period off operation as specified in the Schedule of Requirements, is annexed to the Technical specification. The total cost of these items, at the unit prices quoted in each bid, will be added to the bid price.

OR

- ii) The purchaser will draw up a list of high usage and high value items of components and spare parts, along with the estimated quantities of usage in the initial period of operation as indicated in the Schedule of Requirements. The total cost of these items and quantities will be computed from the corresponding unit prices quoted by the bidder and added to the bid price.

OR

- iii) the purchaser will estimate that cost of spare parts usage in the initial period of operation specified in the Schedule of Requirements, based on the information furnished by each bidder, as well as on the past experience of the purchaser or other purchaser in similar situations. Such costs shall be added in the bid price for evaluation.

d. Availability of spare parts and after sales service facilities in India:

The cost to the purchaser of establishing the required service facilities and parts inventories, as outlined in the Schedule of Requirements of elsewhere in the bidding documents, if quoted separately, shall be added to the bid price.

- e. **The projected operating and maintenance cost during the life of the equipment:**
These costs, which form a major portion of the life cycle cost of the equipment, will be evaluated in accordance with the criteria specified in the **Schedule of Requirements** and/or in the Technical Specifications.
- f. **Specific additional criteria:**
Other specific additional criteria to be considered in the bid evaluation and the corresponding evaluation method shall be incorporated in the **Schedule of Requirements** and/or in the Technical Specifications.
- 27. **Bidder's capability to perform the contract**
 - 27.1 The purchaser will determine to its satisfaction whether the bidder, which is selected as having submitted the lowest evaluated responsive bid, is qualified and prima facie capable to perform the contract satisfactorily.
 - 27.2 The determination will take into account the bidder's financial, technical and production capabilities for fulfilling all the requirements of the purchaser as specified in the bidding documents. This exercise will be based upon the examination of the documentary evidence of the bidder's qualifications submitted by the bidder, pursuant to ITB clause 2 and 13, as well as such other allied information as the purchaser deems necessary and appropriate.
 - 27.3 An affirmative determination will be a prerequisite for award of the contract to the bidder. A negative determination will result in rejection of the bidder's bid, in which event the purchaser will proceed to the next lowest evaluated bid to make a similar determination of the bidder's capabilities to perform satisfactorily.
- 28. **Purchaser's right to vary quantities at the time of award.**
- 28.1 The purchaser reserves the right at the time of awarding the contract to increase or decrease by up to 25%, the quantity of goods and services specified in the schedule of requirements without any change in the unit price or other terms and conditions.
- 29. **Contacting the purchaser**
 - 29.1 From the time of the bid opening to the time of awarding the contract, if a bidder wishes to contact the purchaser on any matter related to the bid, it should do so in writing.
 - 29.2 Any effort by a bidder to influence the purchaser in the purchaser's decision on bid evaluation, bid comparison or contract award shall result in the rejection of the bidder's bid, besides other suitable administrative actions against the bidder, as deemed fit by the purchaser.

F. AWARD OF CONTRACT

- 30. **Award Criteria**
 - 30.1 Subject to ITB clause 28, the purchaser will award the contract to the successful bidder whose bid has been determined as the lowest evaluated bid, provided further that the bidder is determined to be qualified and prima facie capable to perform the contract satisfactorily.
- 31. **Purchaser's right to accept any bid and to reject any or all bids**
 - 31.1 The purchaser reserves the right to accept or reject any bid and to annul the bidding process and reject all bids at any time prior to the award of contract, without thereby incurring any liability, whatsoever, to the affected bidder or bidders.
- 32. **Notification of award**
 - 32.1 Before the expiry of the period of bid validity, the purchaser will notify the successful bidder in writing, by registered letter or by e-mail/fax, to be confirmed in writing by registered letter that its bid has been accepted. The schedule(s) of requirement and the corresponding quantity of the item(s) ordered, which has been accepted, will, inter-alia, be mentioned in the notification.
 - 32.2 The notification of award will constitute the formation of the contract.
 - 32.3 Upon the successful bidder's furnishing the performance security, pursuant to ITB clause 34, the purchaser will promptly notify each unsuccessful bidder and will discharge its bid security, pursuant to ITB clause 15.
- 33. **Signing of contract**
 - 33.1 At the same time as purchaser notifies the successful bidder that its bid has been accepted, the purchaser will send to the bidder by registered post or speed post, the contract form provided in the bidding documents, incorporating all agreements between the parties.
 - 33.2 Within twenty-one (21) days of issue of the contract form by the purchaser, the successful bidder shall sign and date the contract and return it to the purchaser by registered post or speed post.
- 34. **Performance security**
 - 34.1 Within twenty-one (21) days of the issue of notification of award by the purchaser, the successful bidder shall furnish the performance security in accordance with and as per the instructions incorporated in the general conditions of contract with regard to performance security.
 - 34.2 Failure of the successful bidder to comply with the requirement of clause 33 or clause 34 shall constitute sufficient grounds for annulment of the award and forfeiture of the bid security, in which event the purchaser may make the award to the next lowest evaluated bidder or call for new bids.

ICAR-CENTRAL SHEEP & WOOL RESEARCH INSTITUTE

Avikanagar Tehsil Malpura Distt. Tonk (Rajasthan) 304501

SECTION –III

GENERAL CONDITIONS OF CONTRACT (GCC)

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ICAR-CENTRAL SHEEP & WOOL RESEARCH INSTITUTE

Avikanagar Tehsil Malpura Distt. Tonk (Rajasthan) 304501

GENERAL CONDITIONS OF CONTRACT (G.C.C)

1. Definitions

- 1.1 In this contract the following terms shall be interpreted as indicated. "IFB" means invitation for bids
- a) "ITB" means Instruction of Bidders.
 - b) "GCC" means General Conditions of Contract
 - c) 'RC' means rate Contract
 - d) "Contract" means a legal agreement entered into between the purchaser and the supplier, as recorded in the agreement signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.
 - e) "Contract Price" means the price payable to the supplier under a contract for the full and proper performance of its contractual obligations.
 - f) "Goods" means all the items, materials, equipment and/or machinery, which the supplier is required to supply to the purchaser in terms of a contract.
 - g) "Services" means the services ancillary to the supply of the goods, such as transportation and insurance and any other incidental services, such as installation, commissioning, provision of technical assistance, training and other such obligations of the supplier covered under a contract.
 - h) "Purchaser" means the buyer named in a bidding document and in the corresponding contract, purchasing the goods ordered and includes its successor and/or assignees.
 - i) "Consignee" means the individual or body to whom the contracted goods are required to be delivered as per the terms and the conditions incorporated in a contract.
 - j) "Supplier" means the individual or firm supplying the goods under a contract and includes its successor and/assignees.
 - k) "Day" means calendar day of the Gregorian calendar.
 - l) "Month" means calendar month of the Gregorian calendar.

2. Application

- 2.1 These general conditions of contract (as contained in this section) shall apply to the extent they are not superseded by provisions in other parts of the contract.

3. Country of origin

- 3.1 All goods and services supplied under the contract shall have their origin in India or in the countries, with which the Government of India has trade relations.
- 3.2 For purposes of this clause, "Origin" means the place where the goods are mined, grown or produced or from which the services are supplied. Goods are produced when through manufacturing, processing and substantial or major assembling of components, a commercially recognized new product results that is substantially different in basic characteristics or in purpose or utility from its components.
- 3.3 The origin of goods and services is distinct from the nationality of the supplier.

4. Standards

- 4.1 The goods supplied under this contract shall conform to the standards mentioned in the "Technical Specifications" and when no applicable standard is mentioned, to the latest authoritative standards as applicable to the goods country of origin.

5. Use of contract documents and information

- 5.1 The supplier shall not, without the purchaser's prior written consent disclose the contract or any provision thereof or any specification, plan, drawing, pattern, sample or information furnished by or on behalf of the purchaser in connection therewith to any person other than a person employed by the supplier in the performance of the contract. Also, disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for the purposes of such performance.
- 5.2 The supplier shall not without the purchaser's prior written consent, make use of any document or information enumerated in GCC sub clause 5.1 except for the purpose of performing the contract.
- 5.3 Every document other than the contract itself, mentioned in GCC sub-clause 5.1, shall remain the property of the purchaser and shall be returned (in all copies) to the purchaser on completion of the supplier's performance under the contract, if so required by the purchaser.

6. Patent rights

- 6.1 The supplier shall at all times indemnify the purchaser, free of cost, against all third- party claims of infringement of patent, trade mark or industrial design rights arising from use of the goods or any part thereof in India.

7. Performance Security

- 7.1 Within 21 (twenty one) days after the issue of notification of award by the purchaser the supplier, shall furnish performance security to the purchaser for an amount off 10% (ten per cent) of the contract value, valid up to 60 (sixty) days after the date of completion of all contractual obligations by the supplier, including the warranty obligations.
- 7.2 In the event of any correction of defects or a replacement of defective material during the warranty period, the warranty for the corrected/replaced material shall be extended to a further period of twelve months from the date of the correction/replacement and the Performance Security for the proportionate value (which will be determined by the purchaser in consultation with the supplier) shall be extended by 60 (sixty) days over and above the extended warranty period.
- 7.3 In the event of any contract amendment, the supplier shall, within 21 (twenty one) days of issue of such amendment, furnish the necessary amendment to the performance Security, rendering the same valid in all respects in terms of the contract, as amended.
- 7.4 The proceeds of the Performance Security shall be payable to the purchaser as compensation for any loss resulting from the supplier's failure to complete its obligations under the contract.
- 7.5 The performance security shall be denominated in Indian Rupees or in the currency of the contract and shall be in one of the following forms:
- Demand Draft on any scheduled commercial bank in India, to be drawn in favour of the purchaser as indicated in the Schedule of Requirements.
 - Bank Guarantee issues by a scheduled commercial bank in India, in the prescribed form as provided in section VII/4 of this bidding document.
 - FDR on any scheduled commercial bank in India, to be drawn in favour of the purchaser as indicated in the Schedule of Requirements
- 7.6 Subject to GCC sub-clause 7.4 above, the performance security will be discharged by the purchaser and returned to the supplier on completion of the supplier's contractual obligations including the warranty obligations under the contract.

8. Inspection and tests

- 8.1 The purchaser and/or its nominated representative(s) shall have the right to inspect and/or to test the goods to confirm their conformity to the contract specification and other technical details incorporated in the contract at no extra cost to the purchaser. The **Schedule of Requirements** and the Technical Specification incorporated in the bidding document shall specify what inspections and tests, the purchaser requires and where and how they are to be conducted. The purchaser shall notify, in advance, the supplier in writing, of the identity of any representative(s) for this purpose.
- 8.2 The inspections and tests may be conducted on the premises of the supplier or its subcontractor(s) at the point of delivery and/or at the goods final destination. If conducted on the premises of the supplier or its subcontractor(s), all reasonable facilities and assistance including access to relevant drawings, design details and production data, shall be furnished by the supplier to the inspectors at no charge to the purchaser.
- 8.3 Should any inspected or tested goods fail to conform to the required specifications and standards, the purchaser may reject them and the supplier shall either replace the rejected goods or make all alteration necessary to meet the specifications and standards, as required, free of cost to the purchaser and resubmit the same to the purchaser for conducting the inspections and tests again within the stipulated time.
- 8.4 Where the contract stipulates pre-dispatch inspection by the purchaser's nominated inspecting agency, the supplier shall put up the goods for inspection to the inspecting agency well ahead of time so that the inspecting agency is able to complete the inspection within the stipulated delivery period. If the goods are tendered for inspection at the last moment without providing reasonable time to the inspection agency for completing the inspection, the inspecting agency may carry out the inspection and complete the formality beyond the contractual delivery period at the risk and expense of the supplier. The fact that the items have been inspected after the contractual delivery period will not have the effect of keeping the contract alive and this will be without any prejudice to the legal rights and remedies available to the purchaser under the terms & conditions of the contract.
- 8.5 The purchaser's right to inspect, test and where necessary reject the goods after the goods arrival at the final destination shall in no way be limited or waived by reason of the goods having previously been inspected, tested and passed by purchaser or its representatives prior to the dispatch of the goods from the country of origin or from the supplier premises.
- 8.6 Nothing in GCC clause 8 shall in any way, release the supplier from any warranty or other obligations under the contract.

9. Packing

- 9.1 The supplier shall provide such packing of the goods as is required to prevent their damage or deterioration during their transit to their final destination as indicated in the contract. The packing shall be sufficient to withstand without limitation rough handling and exposure to extreme temperatures, humid weather and precipitation during transit and open storage. The sizes and weights of the packing cases shall also be taken into consideration, where applicable, the available inland mode(s) of transport in India, the remoteness of the goods final destination and the absence of heavy handling facilities at all points in transit Further limitations

and / or mandatory instructions, if any, in the weights, volumes and sizes of the packages shall also be taken care of by the supplier.

9.2 The packing, marking and documentation within and outside the packages shall comply strictly with such special requirements if any, as shall be expressly provided for in the contract, including additional requirements, if any, specified in the **Schedule of Requirements** and any subsequent instructions given by the purchaser.

9.3 Packing instructions:

The supplier will be required to make separate packages for each consignee named in the contract. Each package will be marked by the supplier at its own expense, on three sides with indelible ink/paint, with following details:

- a) Contract no. and date
- b) Name and address of the consignee
- c) Name and address of the supplier
- d) Brief description of goods
- e) Gross weight and outer dimension of the package
- f) Country of origin of goods
- g) Packing list reference no. and
- h) Any other requirement, relevant to the contract.

10. Delivery of goods (FOR destination i.e. CSWRI, Avikanagar)

10.1 Delivery of the goods shall be made by the supplier in accordance with the terms specified by the purchaser in the notification of award and in the contract.

10.2 For the purposes of the contract, "FOB", "CIF", "CIP" and other trade terms used to describe the obligations of the parties shall have the meaning assigned to them in the current edition of "Incoterms" which

11. Transportation

11.1 Where the supplier is required under the contract to deliver the goods F.O.B. transportation of the goods, up

arranged and paid for by the supplier and the cost thereof shall be included in the contract price.

11.2 Where the supplier is required under the contract to deliver the goods CIF or C.I.P. transportation of the

the contract, shall be arranged and paid for by the supplier and the cost thereof shall be included in the contract price.

11.3 supplier shall arrange the shipment by Indian flag vessels or vessels of Conference lines in which India is a member. Where the supplier is required under the contract to deliver the goods F.O.B and also to arrange on

vessels are not available to transport the goods within the time frame specified in the contract. However, before arranging such alternative transportation, the supplier shall obtain prior concurrence of the purchaser for the

11.4 The supplier shall not arrange part shipments and/or trans-shipment without the prior written consent of the purchaser.

11.5 consequences (including financial loss) that the purchaser may face due to such violations.

12.1 or damage incidental to manufacture or acquisition, transportation, storage and delivery as indicated below in

12.2 Where delivery of the goods is required by the purchaser on CIF or CIP basis, the supplier shall arrange insurance shall be the responsibility of the purchaser.

12.3 (one hundred and ten per cent) of the CIF or CIP value of the goods from "warehouse" to "warehouse" (final

13. Distribution of dispatch documents (If applicable)

13.1 The shipping and other documents as well as dispatch details to be furnished by the supplier to the purchaser and/or to the purchaser's nominated authorities to enable the purchaser and/or its nominated authorities to clear and/or accept the goods will depend on the mode of dispatch of the goods and the terms of delivery, as specified in the Schedule of Requirements and in the contract and, subject to the same, the instructions in this regard will be as indicated below:

a) **For goods supplied from abroad:**

Within 24 hours of shipment, the supplier shall notify the purchaser and its nominated authorities (as specified in the contract) and the insurance company by cable or telex or fax, the full details of the shipment including

contract number, description of goods, quantity, the vessel, the bill of lading number and date/airway bill number and date, port of loading, date of shipment, port of discharge, expected date of arrival at the port of entry etc. Further, the supplier shall also immediately dispatch by registered air-mail the specified number of copies of the following documents to the above authorities:

- i) Supplier's invoice showing contract number, description of goods, quantity, unit price and total amount:
- ii) Original and copies of the negotiable, clean, on-board bill of lading marked freight to pay and copies of non-negotiable bill of lading;
- iii) Copies of packing list identifying the contents of each package;
- iv) Insurance certificate;
- v) Manufacturer's/supplier's warranty certificate;
- vi) Pre-dispatch inspection certificate issued by the purchaser's nominated inspection agency (if so specified) and the supplier's factory inspection report; and
- vii) Certificate of origin.

The above documents shall be received by the purchaser and other authorities mentioned above at least one week before the arrival of goods at the port or place of arrival and, if not received, the supplier will be responsible for any consequent expenses.

b) For goods supplied from within India:

Within 24 hours of dispatch of the goods, the supplier shall notify the complete dispatch details to the purchaser and/or the purchaser's nominated authorities (as specified in the contract) and the insurance company. The supplier shall also mail the specified number of copies of the following documents to them:

- i) The supplier's invoice showing contract number, description of goods, quantity, unit price and the total amount;
- ii) Railway receipt or Delivery note;
- iii) Packing list identifying contents of each package;
- iv) Insurance certificate;
- v) Manufacturer's/Supplier's warranty certificate;
- vi) Pre-dispatch inspection certificate issued by the purchaser's nominated inspection agency (is so specified) and the supplier's factory inspection report; and
- vii) Certificate of origin.

The purchaser shall receive the documents at least one week before the arrival of the goods (except where it is handed over to the consignee with all the documents) and if not received, the supplier will be responsible for any consequent expenses.

The documents to be provided by the supplier for claiming payment are specified in GCC clause 17 ("Payment").

14. Incidental Services

14.1 The purchaser may include in the contract any or all following services and/or some additional services, if specified in the **Schedule of Requirements** and the supplier is required to provide the same:

- a) Performance or supervision of onsite assembly and/or start-up of the supplied goods,
- b) Furnishing of tools required for assembly and/or maintenance of the supplied goods,
- c) Furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied goods,
- d) Performance or supervision or maintenance and/or repair of the supplied goods, for a period of time agreed to by the parties, provided that this service shall not relieve the supplier of any warranty obligations under the contract, and
- e) Training the purchaser's personnel, at the supplier's plant and/or on site, in assembly, start-up, operation, maintenance and/or repair of the supplied goods.

15. Spare parts

15.1 As specified in the Schedule of Requirements, the supplier may be required to provide any or all of the following materials, notifications and information pertaining to spare parts manufactured and/or distributed by the supplier.

- a) such spare parts as the purchaser may elect to purchase from the supplier, provided that this will not relieve the supplier of any warranty obligations under the contract; and
- b) in the event of termination of production of the spare parts:
 - i) advance notice to the purchaser of the pending termination, in sufficient time to permit the purchaser to procure needed requirements and
 - ii) Immediately following such termination, furnishing at no cost to the purchaser, the blueprints, drawings and specifications of the spare parts, if requested.

15.2 Supplier shall carry sufficient inventories to assure ex-stock supply of consumable spares for the goods. Other spare parts and components shall be supplied as promptly as possible but in any case within three months of placement of order and opening the letter of credit.

16. Warranty

- 16.1 The supplier warrants that the goods supplied under the contract is new unused of the most recent current models and incorporate all recent improvements in design and materials unless provided otherwise in the contract. The supplier further warrants that the goods supplied under the contract shall have no defect arising from design, materials (except when the design adopted and/or the material used are as per the purchaser's specifications) or workmanship or from any act or omission of the supplier, that may develop under normal use of the supplied goods under the conditions prevailing in India.
- 16.2 This warranty shall remain valid for 12 (twelve) months or indicated in technical specification of the equipment after the goods or any portion thereof as the case may be, have been delivered to the final destination and installed and commissioned at the final destination and accepted by the purchaser in terms of the contract or for 18 (eighteen) months from the date of dispatch from the supplier's works for domestic goods or for 21 (twenty-one) months after the date of shipment from the port or place of loading in the source country for imported goods, whichever is earlier, unless specified otherwise in the Schedule of Requirements.
- 16.3 The purchaser shall promptly notify the supplier in writing of any claim arising under this warranty.
- 16.4 Upon receipt of such notice, the supplier shall with all reasonable speed (or within the period), if specified in the Schedule of Requirements and the contract), repair or replace the defective goods or parts thereof, free of cost, at the ultimate destination. The supplier shall take over the replaced parts/goods at the time of their replacement. No claim whatsoever shall lie on the purchaser for the replaced parts/goods thereafter.
- 16.5 In the event of any correction of a defect or replacement of any defective material during the warranty period, the warranty for the corrected/replaced material shall be extended to a further period of 12(twelve) months from the date, such corrected/replaced material starts functioning to the satisfaction of the purchaser.
- 16.6 If the supplier, having been notified, fails to remedy the defect(s) within the reasonable period, if specified in the **Schedule of Requirements and the contract**), the purchaser may proceed to take such remedial action as may be necessary at the supplier's risk and expense and without prejudice to any other rights, which the purchaser may have against the supplier, under the contract.

17. Payment: the payment will be made after successfully supply/installation of the equipment or if training required payment will be made after successfully training.

- 17.1 The payment shall be made in the currency/currencies specified in the contract. The supplier shall send its claim (with relevant documents, as required) to the appropriate paying authority as specified in the **Schedule of Requirements** and the contract. Before claiming any payment, the supplier shall ensure that all the contractual obligations for claiming that payment have been duly fulfilled.
- 17.2 The payment shall be made in the following manner and on production of the following documents.

A) Payment for goods supplied from abroad: i) —

~~90% of the contract price shall be paid through irrevocable letter of credit established in favour of the foreign supplier in a scheduled commercial bank in India or a bank in the supplier's country acceptable to the purchaser, upon submission of the following documents:~~

- a) ~~Certified copy of the fax sent by the supplier to the purchaser and others as per GCC sub-clause 10.3(a).~~
- b) ~~Supplier's signed commercial invoice showing contract number, description of the supplied goods, —~~
~~goods.~~
- e) ~~Original clean on board bill of lading marked freight pre-paid consigned to the interim/ port consignee~~
- d) ~~Packing list, identifying contents of each package.~~
- e) ~~Insurance policy or certificate in duplicate endorsed in blank with claims payable in India in the currency~~
- f) ~~Manufacturer's/supplier's warranty certificate and supplier's factory inspection report.~~
- g) ~~Pre-despatch inspection certificate issued by the purchaser's nominated inspection agency, if so~~
- h) ~~Certificate of origin.~~
- i) ~~Supplier's certificate confirming that the required documents have been sent to all concerned in terms of~~
- j) ~~Supplier's certificate confirming that the amounts shown in the invoice are correct in terms of the contract and that all the terms and conditions of the — contract have been complied with for claiming this payment. —~~
- k) ~~—~~

~~**Requirements and the contract.**~~

ii) ~~on final acceptance~~

~~10% of the contract price of goods received shall be paid within 30(thirty) days of receipt of goods on~~

iii) ~~Payment of agency commission: —~~

Payment shall be made in Indian rupees within 30 (thirty) days of presentation of claim supported by a

agent for claiming this payment.

This payment (towards agency commission) will be made by the purchaser's paying authority specified in the contract and not through letter of credit.

B) Payment for goods supplied from India:

not through letter of credit), in the following manner:

- i) _____
- i) The supplier's invoice showing contract number description of goods, quantity, unit price and the total _____
- ii) Railway receipt or Delivery note.
- iii) _____
- iv) Insurance certificate; v) _____
- vi) Pre-dispatch inspection certificate issued by the purchaser's nominated inspection agency, if so _____
- vii) Certificate of origin _____
- viii) _____
- ix) Any other document(s) and/or modification of above documents specified in the Schedule of Requirements _____
- ii) _____

claim, duly supported by the final acceptance certificate for the corresponding delivery issued by the purchaser's representative in the Proforma given in section.....of the bidding documents.

- C) _____ in _____ of Requirements and in the contract. The payment terms applicable for such services and supervision will also be specified therein.

17.3

- i) _____ for Documentary Credit of the International Chamber of Commerce.
- ii) _____ charged to the suppliers account.
- iii) If the letter of credit is required to be extended/reinstated for reasons not attributable to the purchaser, the _____

18. Prices structure:

- a. The ICAR Research Institutes are exempt from Excise and Customs Duties on Research Consumables, vide Notification No. 10/97-CE dated 01.03.1987 (as amended by 16/07-CE) and Notification No. 51/96- Customs respectively. However, for the ICAR Institutes to avail the aforesaid Duty Exemption benefits, the Prices are required to be quoted by Manufacturers preferably on FOR basis, without including any Excise/Customs Duty component.
- b. Alternatively, however, the Authorized Dealers/Retailers may quote their most competitive FOR prices, with maximum possible Dealer's Special Discount.
- c. The rates and prices quoted shall be in Indian Rupees only.
- d. All duties, taxes and levies payable by the supplier under the contract shall be included in the quoted price. The purchaser will not pay any such duties, taxes and levies separately. However, ICAR-CSWRI, Avikanagar is registered with DSIR, therefore, eligible for GST on concessional rate as per GOI GST Notification/s 47/2017-Integrated Tax (Rate) and 45/2017-Central Tax (Rate) dated 14.11.2017. GST as legally and contractually liveable will be quoted separately by indicating the nature and the current rate of GST, as applicable at the time of quoting. The GST will be paid extra at actual at the time of supply, provided the transaction of sale is legally liable to the amount of the GST is contractually payable. If the supplier in its quotation does not ask for GST extra, the same shall not be paid even if it asks for the same at a later date.
- e. The rates and prices quoted by the supplier shall remain firm and fixed during the currency of the contract and shall not be subject to variation on any account, whatsoever, including statutory variations, if any. "However, GST will be paid extra as per provision under Clause 18 (d) above"

- 18.1 Prices charged by the supplier for the goods supplied and the services performed under the contract shall not vary from the prices quoted by the supplier in its bid with the exception of any price adjustment authorized in the Schedule of Requirements.
- 19. Modification of contract.**
- 19.1 The purchaser may at any time, by a written order given to the supplier pursuant to GCC clause 31, make changes and modifications within the general scope of contract in any one or more of the following:
- 32.1 drawings, designs or specifications, where goods to be supplied under the contract are to be specifically manufactured for the purchaser,
- 32.2 the mode of packing
- 32.3 the mode of dispatch
- 32.4 the place of delivery
- 32.5 the services to be provided by the supplier, and/or
- 32.6 any other area(s) of the contract, depending on the merits of the case.
- 19.2 If any change causes an increase or decrease in the cost of or in the time required for the supplier's performance of any provision under the contract, an equitable adjustment shall be made in the contract price or contract delivery schedule or both and the contract shall be amended accordingly. Any claim by the supplier for adjustment under this clause must be asserted within 21(twenty-one) days from the date of the supplier's receipt of the purchaser's amendment/modification of the contract.
- 19.3 Subject to GCC sub-clauses 19.1 and 19.2 no variation in or modification of the terms of the contract shall be made except by written amendment signed by both the parties.
- 20. Assignment**
- 20.1 The supplier shall not assign, in whole or in part, its obligations to perform under the contract, except with the purchaser's prior written consent.
- 21. Sub Contracts**
- 21.1 The supplier shall notify the purchaser in writing of all sub-contracts awarded under the contract, if not already specified in its bid. Such notifications, in its original bid or later, shall not relieve the supplier from any liability or obligation, whatsoever under the contract.
- 21.2 Subcontract shall be only for bought-out items and sub-assemblies.
- 21.3** Subcontracts must comply with the provisions of GCC clause 3.
- 22. Delays in the Supplier's performance**
- 22.1 Delivery of the goods and performance of the services shall be made by the supplier in accordance with the time schedule specified by the purchaser in the "**Schedule of Requirements**".
- 22.2 Except as provided under GCC clause 25, any unexcused delay by the supplier in maintaining its contractual delivery obligations shall render the supplier liable to any or all of the following sanctions:
- Imposition of liquidated damages,
 - Forfeiture of its performance security and/or
 - Termination of the contract for default.
- 22.3 If at any time during the performance of the contract, the supplier or its sub-contractor(s) should encounter conditions hindering timely delivery of the goods and performance of services, the supplier shall promptly notify the purchaser in writing of the fact of the delay, its likely duration and its cause(s). After the receipt of the supplier's notice, the purchaser as soon as practicable, shall evaluate the situation and may at its discretion extend the supplier's time for performance, in which case the extension of the delivery period shall be ratified by issuing an amendment to the contract.
- 22.4 The supplier shall not dispatch the goods after expiry of the delivery period. The supplier is required to apply to the purchaser for extension of delivery period and obtain the same before dispatch. In case the supplier dispatches the goods without obtaining an extension, it would be doing so at its own risk and no claim for payment for such supply and/or any other expense related to such supply shall lie against the purchaser.
- 23. Liquidated damages**
- 23.1 Subject to GCC clause 25, if the supplier fails to deliver any or all of the goods or perform the services within the time period(s) specified in the contract, the purchaser shall without prejudice to its other remedies under the contract, deduct from the contract price, as liquidated damages, a sum equivalent to 0.5% (half percent) of the delivered price of the delayed goods or unperformed services for each week of delay or part thereof until actual delivery or performance, up to a maximum deduction of 10% (ten percent) of the delayed goods or services contract price. Once the maximum is reached, the purchaser may consider termination of the contract, if the same have not been terminated already.
- Further, during the above mentioned delayed period of supply and/or performance, the supplier, notwithstanding any stipulation in the contract for increase in price for any ground, shall not be entitled to any increase in price and cost, whatsoever, which take place during the period of delay. But, nevertheless, the

purchaser shall be entitled to the benefit any decrease in price and cost on any ground during the period of delay.

24. Termination for default

24.1 The purchaser, without prejudice to any other remedy for breach of contract may by written notice of default sent to the supplier, terminate the contract in whole or in part, if the supplier fails to deliver any or all of the goods or fails to perform any other contractual obligation(s) within the time period specified in the contract, or within any extension thereof granted by the purchaser pursuant to GCC clause 22.

24.2 In the event the purchaser terminates the contract in whole or in part pursuant to GCC sub-clause 24.1, the purchaser may procure, upon such terms and conditions and in such manner as it deems appropriate, goods and/or services similar to those undelivered and the supplier shall be liable to the purchaser for any excess cost for such similar goods and/or services. However, the supplier shall continue to perform the contract to the extent not terminated.

25. Force Majeure

25.1 Notwithstanding the provisions of GCC clauses 22,23 and 24, the supplier shall not be liable for forfeiture of its performance security, liquidated damages or termination for default, if and to the extent that its delay in performance or other failure to perform its obligations under the contract is the result of an event of Force Majeure.

25.2 For purposes of this clause, "Force Majeure" means an event beyond the control of the supplier and not involving the supplier's fault or negligence and not foreseeable. Such events may include, but are not restricted to acts of the purchaser in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes.

25.3 If a Force Majeure situation arises, the supplier shall promptly notify the purchaser in writing of such conditions and the cause thereof. Unless otherwise directed by the purchaser in writing, the supplier shall continue to perform its obligations under the contract as far as reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

26. Termination for insolvency

26.1 If the supplier becomes bankrupt or otherwise insolvent, the purchaser may terminate the contract by giving written notice to the supplier, without any compensation to the supplier, provided, that such termination will not prejudice or affect any right of action or remedy which has accrued and/or will accrue thereafter to the purchaser.

27. Termination for convenience

27.1 The purchaser, by written notice sent to the supplier, may terminate the contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that the termination is for the purchaser's convenience, the extent to which performance of the supplier under the contract is terminated, and the date with effect from which such termination becomes effective.

27.2 The goods that are complete and ready for shipment within 30 (thirty) days after the supplier's receipt of notice of termination shall be accepted by the purchaser at the contract terms and prices. For the remaining goods, the purchaser may elect:

- a) to have any portion completed and delivered at the contract terms and prices; and /or
- b) to cancel the remainder and pay to the supplier an agreed amount for partially completed goods and services and for materials and parts already procured by the supplier for fulfilling the contractual obligations.

28. Resolution of disputes

28.1 If any dispute or difference of any kind arises between the purchaser and the supplier in connection with or arising out of the contract, the parties shall make every effort to resolve the same amicably by mutual consultations.

28.2 If, after thirty (30) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the purchaser or the supplier may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given.

28.3 Any dispute or difference, in respect of which a notice of intention to commence arbitration has been given in accordance with GCC sub-clause 28.2, shall be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the goods under the contract.

28.4. The dispute resolution mechanism to be applied pursuant to GCC sub-clause 28.3 shall be as follows:-

- a) If any dispute or difference arises between the purchaser and the supplier relating to any matter connected with the contract, the parties shall make every effort to resolve the same amicably by mutual discussion. However, if the parties fail to resolve the dispute or difference by such mutual discussion within 30 days, either the purchaser or the supplier may give notice to the other party of its intention to refer the same to arbitration. The arbitration shall commence thereafter. The arbitration shall be conducted by a sole arbitrator, who will be

- appointed by the Secretary, ICAR and the procedure to be followed in this respect will be as per the Indian Arbitration and Conciliation Act, 1996. The venue of the arbitration shall be the place from where the contract is issued.
- b) The decision of majority of arbitrators shall be final and binding upon both the parties.
- c) The cost and expenses of the arbitration proceedings will be paid as determined by the arbitral tribunal. However, the expenses incurred by each party in connection with preparation, presentation etc. of its proceedings as also fees and expenses paid to the arbitrator appointed by such party or on its behalf shall be borne by each party itself.
- 28.5. However, where the value of the contract is Rs.15 lacs (Rupees one and half million) and below, the disputes of differences arising in it shall be referred to a sole arbitrator. The sole arbitrator shall be appointed by mutual agreement between the parties. If the parties fail to agree on arbitrator within 30 (thirty) days from the receipt of a request by one party from the other party to so agree, the appointment shall be made upon request of a party, by the Indian Council of Arbitration or the President of the Institution of Engineers (India).
- 28.6 The venue of arbitration shall be the place from where the contract is issued.
- 29. Governing language**
- 29.1 The contract shall be written in English language. All correspondence and other documents pertaining to the contract, which the parties exchange, shall also be written in English.
- 30. Applicable law**
- 30.1 The contract shall be interpreted in accordance with the laws of India.
- 31. Notice**
- 31.1 Any notice given by one party to the other pursuant to the contract shall be sent in writing or by e-mail and confirmed in writing to the addresses specified in the **Schedule of Requirements**.
- 31.2 A notice shall be effective when delivered or on the notice's effective whichever is letter
- 32. Taxes and duties**
- 32.7 A foreign supplier shall be entirely responsible for all taxes, stamps duties, license fees and other such levies imposed outside India.
- 32.8 A local supplier shall be entirely responsible for all taxes, duties, license fees etc. incurred until delivery of the contracted goods to the purchaser.
- 32.9 Further instruction if any shall be as provided in the **Schedule of Requirements**.

SECTION – IV SCHEDULE OF REQUIRMENTS

There are three parts under Schedule of Requirements.

Part-1 Mentions the details of Requirements and allied serviced, schedule-wise separately. Part-2 provides the specific information and details in relation to the corresponding clause of section II (Instruction to Bidders). Part-3 provides specific information and details to the corresponding clauses of section III (General Conditions of Contract). Provision of clause 4.2 of Instruction to Bidders shall apply

Part-1, Part-2, Part-3, applicable for this bidding document and provided in the subsequent pages.

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Avikanagar Tehsil Malpura Distt. Tonk (Rajasthan) 304501

PART-1 of Schedule of Requirements (Section- IY)

Schedule-I

List of items to be purchased through open tender

Sr.	File No.	Name of items	Estimated Cost (Rs. in lakhs)	Qty.	EMD (Rs. in lakh)	Last date & time for submitting of tender	Last date & time for opening of tender
1.	1(719)SP/2018	Transformer 315 KVA	7.00	01	00.14	29.10.18	30.10.18
2.		Transformer 500 KVA	10.00	01	00.20	3.00 PM	3.00 PM

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Part – 2 of Schedule of requirements (Section-IV)

The Firms are also required to upload scanned copies of the following documents:

1. Scanned copy of valid relevant Firm Registration certificate
2. Scanned copy of Pan Card and GST No.
3. Scanned copy of Questionnaire
4. Scanned copy of ink signed with seal tender specific authorization from OEM or authorized supplier/dealer of foreign firm
5. Scanned copy of latest ITR
6. Scanned copy of User list/purchase order of its satisfactory installation
7. Scanned copy of Make and Model of all systems, sub systems and additional items which are quoted should be mentioned in the technical details should be provided in the form of Brochures.
8. Scanned copy of D.D. of Tender Fee & E.M.D.
9. Scanned copy of Tender acceptance letter (as per Annexure I)
10. Scanned copy of Price Justification Certificate (as per Annexure II)
11. Scanned copy of No Deviation Certificate - (as per Annexure III)
12. Scanned copy of non-blacklisting certificate (as per Annexure IV)
13. Scanned copy of technical specification or compliance report (as per Annexure V to VIII).
14. Scanned copy of Inspection reports issued by govt. of India authorised labs for all tests mentioned in the technical specification for each transformer.

All necessary documents in support of the details for S.No. 1 to 14 must accompany the technical bid. The bid is liable to be rejected in case documents are not uploaded in the technical bid on CPP Portal, documents are incomplete or in case any certification/registration has already expired but is yet to be renewed. Only essential and necessary valid documents are to be uploaded in the technical bid. Please avoid uploading extraneous and irrelevant documents which unnecessary cause confusion.

Submission of Bids

7. Address for send of EMD/Tender Fee & Technical Brochure etc. : **The Administrative Officer, S&P, ICAR-Central Sheep & Wool Research Institute ,Avikanagar Tehsil Malpura Distt. Tonk 304501 (Rajasthan).**
8. **Deadline for submission of bid is** = **29.10.2018 :upto 15.00 hrs (3.00 PM)**
9. Time and date of bid opening is
 - a. **Technical bid** = **30.10.2018: at 15.00 hrs (3.00 PM)**
 - b. **Financial Bid.** = **To be notified in due course of time to the concerned technically qualified bidders.**
10. **Place of Bid opening** : **CSWRI, AVIKANAGAR.**

ICAR-CENTRAL SHEEP & WOOL RESEARCH INSTITUTE

Avikanagar Tehsil Malpura Distt. Tonk (Rajasthan) 304501

Part -3 of Schedule of Requirements (Section –IV)

1. Inspection and tests: As per Clause No.8 of General Condition of Contract.
2. Packing: As per Clause No.9 of General Condition of Contract.
3. Insurance: As per Clause No.12 of General Condition of Contract.
4. Distribution of dispatch Documents: as per clause No.13 of General Condition of Contract.
5. Incidental Charges: As per Clause No.14 of General Condition of Contract.
6. Warranty: As per Clause No.16 of General Condition of Contract.
7. Payment: The designation and address of paying authority is; The Director, ICAR-Central Sheep & Wool Research Institute, Avikanagar Tehsil Malpura Distt. Tonk 304501 (Rajasthan).
8. Prices: The Institute is entitled to avail the concessional rate of Custom and Excise duty; therefore rate should be quoted accordingly.
9. Resolution of Disputes: As per Clause No.28 of General Condition of Contract.
10. Notices:

The address of the Purchaser for the purpose is:

The Director, ICAR-Central Sheep & Wool Research Institute, Avikanagar Tehsil Malpura Distt. Tonk 304501 (Rajasthan).
11. Taxes and duties: No Form “D”,“C” will be issued by this Institute. Rest terms as per Clause No.32 of General Condition of Contract.

SECTION -V
TECHNICAL SPECIFICATION AND QUALITY CONTROL REQUIREMENTS

TECHNICAL SPECIFICATION

FOR

11/0.433 KV, 315 KVA

COPPER WOUND THREE PHASE DISTRIBUTION

TRANSFORMERS OF Energy Efficient Level-2(BEE Star-1)

WITH CRGO(STACK/WOUND)/AMORPHOUS CORE

RATING OUTDOOR TYPE (COPPER WOUND) DISTRIBUTION TRANSFORMERS ENERGY EFFICIENT LEVEL-2 (BEE Star-1) AGAINST TN-2413.

1. SCOPE:

This specification covers the design, engineering, manufacture, assembly, inspection and testing at manufacturer's works before supply and delivery at site of Oil immersed, Oil Natural Air Natural (ONAN) outdoor type 11KV/433 V, three phase, 50 Hz, double wound core type, outdoor Type, Copper Wound Distribution Transformers, complete with fittings and accessories for use in Distribution System.

- 1.1 The Equipment Offered shall be complete with all parts necessary for their effective and trouble free operation. Such parts will be deemed to be within the scope of the supply irrespective of whether they are specifically indicated in the commercial order or not.
 - 1.1.1 It is not the intent to specify herein complete details of design and construction. The equipment offered shall conform to the relevant standards and be of high quality, sturdy, robust and of good design and workmanship complete in all respects and capable to perform continuous and satisfactory operations in the actual service conditions at site and shall have sufficiently long life in service as per statutory requirements. The dimensional drawings attached with this specification and the notes thereto are generally of illustrative nature. In actual practice, notwithstanding any anomalies, discrepancies, omissions, incompleteness, etc. in these specifications and attached drawings, the design and constructional aspects, including materials and dimensions, will be subject to good engineering practice in conformity with the required quality of the product, and to such tolerances, allowances and requirements for clearances etc. as are necessary by virtue of various stipulation in that respect in the relevant Indian Standards, IEC standards, I.E. Rules, I.E Act and other statutory provisions.
- 1.2 The Tendered / supplier shall bind him to abide by these considerations to the entire satisfaction of the Purchaser and will be required to adjust such details at no extra cost to the purchaser over and above the tendered rates and prices.
- 1.3 Tolerances on all the dimensions shall be in accordance with provisions made in the relevant Indian/ IEC standards and in these specifications. Otherwise the same will be governed by good engineering practice in conformity with required quality of the product.

2. APPLICABLE STANDARDS:

Unless otherwise modified in the specifications, the Distribution Transformers, including various accessories, shall generally comply with the following Indian Standards / REC Specifications. The standard(s) shall be with latest amendment, if any, from time to time.

Note: Wherever ISS are mentioned, equivalent or better International standards are also acceptable

IS: 1180 Part-1 2014: Specification for outdoor type oil immersed distribution transformers up to and including 2500 KVA,33 KV.

IS:8603:2008 – Dimensions for porcelain transformers bushings for use in heavily polluted atmospheres 12/17.5 kV, 24 kV and 36kV (Amalgamating IS 8603 (Parts 1,2&3) : 1977

IS:2026 (PART-I,II,III,IV & V)/1981 – Power Transformers

IS:6600/1978 : Guide for loading of oil immersed Transformers

IS:335/1983 : New insulation oils for Transformers

IS:3347 (Part-I/Sec. 1 & 2) : Dimension of Porcelain parts & Metal parts for Transformer bushing (1.1 KV).

IS:3347 (PART-III/Sec-1 & 2) : Dimensions of Porcelain parts & Metal parts for Transformer bushing (17.5 KV).

IS:12444 : Specification for copper wire rod.

IS:7421 : Porcelain Transformer Bushings for low voltage – upto 1 KV.

IS:2099/1986 : Porcelain Transformer bushing for AC volts above 1000 volts.

IS:3639/1966 : Fittings & accessories for Transformers

IS:1866/1978 : Code of practice for maintenance & supervision of insulating oil in service.

IS:5484 : Specifications for Aluminium wire rods.

IS:9335 : Specifications for insulating kraft paper.

IS:1576 : Specifications for solid insulating press Boards for electrical purposes.

IS:6162 : (Part I) : Specification for paper covered Aluminium round conductors

IS:6162 : (Part II) : Specification for paper covered Aluminium rectangular conductors

IS:104 : Ready mixed paint, brushing zinc chromate, painting

IS:649 : Testing of steel sheets and strips for magnetic circuits.

IS:2362 : Determination of water content in oil for porcelain bushing transformers.

IS: 4257: Dimensions for clamping arrangements for bushings.

IS:5561: Electrical Power Connector

IS:6262: Method of test for power factor and di-electric constant of electrical insulating liquids.

IS:6792: Determination of electrical strength of insulating oil.

IS 6160 : Rectangular conductor for electrical machines.

IS:10028 : Selection, Installation and maintenance of transformers

IS: 3401 : Silicagel

IS: 5/1961: Colour for ready mixed paints

REC Specification No. 2

REC Specification No. 39/1993

CEA Specification, Chapter 4

Note:- Besides above changes, the technical parameters of the specifications wherever are deviating from the IS:1180 (Part-I/2014) , the same shall be in accordance with IS:1180 (Part-I/2014) and its latest amendments, if any and the changes where the IS:1180 (Part-I/2014) is silent for technical parameters, same shall be applicable as per Central Electricity Authority specification

Material conforming to other internationally accepted standards, which ensure equal or higher quality than the standards mentioned above would also be acceptable. 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 Translations shall be furnished along with the offer.

3. SERVICE CONDITIONS:

The distribution transformers to be supplied against this specification shall be suitable for satisfactory continuous operation under the following climatic conditions as per IS 2026 (Part- I) latest revision.

- | | |
|--|----------------------------|
| i) Peak ambient temperature | : 50°C |
| ii) Minimum Ambient Temperature in shade | : -5°C |
| iii) Maximum average ambient temp. in a 24 hours period in shade | : 45°C |
| iv) Maximum yearly weighted average ambient temperature | : 35°C |
| v) Maximum temperature attainable by an object exposed to sun | : 60°C |
| vi) Maximum relative humidity | : 100 % |
| vii) Average number of thunder storm days per annum | : 40 |
| viii) Average number of rainy days per annum | : 120 |
| ix) Average annual rainfall | : 15-100 cm |
| x) Number of months of tropical monsoon conditions | : 4 Months |
| xi) Maximum wind pressure | : 195 Kg/mt ² |
| xii) Altitudes | : Not exceeding 1000 mtrs. |

The equipment shall be for use in moderately hot and humid tropical climate, conducive to rust and fungus growth.

4. **PRINCIPAL PARAMETERS:**

The Transformers shall be suitable for outdoor installation with three phase 50 Hz 11 KV system in which the neutral is effectively earthed and should be suitable for outdoor service as step down transformers under fluctuations in supply voltage upto plus 10% to minus (-) 15% permissible under Indian Electricity Act and rules there under.

The transformer shall conform to the following specific parameters:

- i) Continuous rated capacity : 315 KVA
- ii) System Voltage (Max.) : 12 KV
- iii) Rated HT voltage : 11 KV
- iv) Rated LT voltage : 433 V (P-P)/250 V (P-N)
Line current HV : 16.53 A
Line Current LV : 420.02 A
- v) Frequency : 50 Hz
- vi) No. pf phases : THREE
- vii) Primary connection (HT) : DELTA
- viii) Secondary connection (LT) : STAR
- ix) Vector Group : Dyn-11
- x) Percentage impedance at 75°C : 4.5%
- xi) Taps (off circuits) : TAPS ARE NOT REQUIRED.
- xii) Type of cooling : ON AN
- xiii) Fault level of the system : 750 MVA

Primary winding shall be DELTA connected and the secondary winding shall be STAR connected (vector symbol Dyn-11), so as to produce a positive displacement of 30° from the primary to the secondary vectors of the same phase. The neutral of the secondary winding shall be brought out to a separate insulated terminal. The transformers shall be **Copper Wound**.

The transformers shall be designed and constructed to withstand without damage the thermal and dynamic stresses of an external short circuit. The manufacturer / supplier shall furnish all relevant design data and calculations in support of having fulfilled this requirement as stipulated in IS:2026 (Part-I)

5. **NO LOAD VOLATGE RATIO:**

The No load voltage ratio(s) shall be 11000/ 433 Volts.

6. **THE LOSSES:**

The total Losses at 50% and 100% loading (at rated voltage and frequency and at 75 deg. C.) shall not exceed the value given below:

RATING (KVA)	MAX. LOSSES AT 50% LOADING (WATTS)	MAX. LOSSES AT 100% LOADING (WATTS)
315	1025	3100

The above specified loss values are maximum guaranteed **as per Energy Efficient level-2 (BEE Star-1)**, without any positive tolerance. In case the actual loss values exceed the above guaranteed values, the transformers shall be rejected at the risk, cost and responsibility of the supplier.

7. **TEMPERATURE RISE:**

Each transformer shall be capable of operating continuously at its normal rating without exceeding following temperature rise with the above service conditions given in clause-3.

- i) 40 Deg. C in oil by thermometer.
- ii) 45 Deg. C in winding by resistance

Temperature rise test shall be conducted on Maximum measured total loss (No load at rated excitation+Load loss at max. current tap at 75 °C) at 100% loading shall be supplied during temperature rise test.

The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise. Bids not meeting the above limits of temperature rise will be treated as non responsive.

It must be noted carefully that readings for hot resistance after shut down shall be taken separately for HV & LV windings, which means, after completing the readings for one winding (HV or LV), the transformer shall be connected

again and rated current passed for another 60 minutes (min.) and shut down taken again to take hot resistance readings for the remaining winding. This is in line with the requirement of CBIP manual, to ensure proper resistance v/s time curves.

Hot Spot temperature not to exceed 98 Deg. C when calculated over an annual weighted average ambient temperature of 35 Deg. C as per IS:2026 (Part-II Clause 4.9.4).
However, the transformer shall be designed for class 'A' insulation.

8. UNBALANCE CURRENT:

The maximum value of unbalance current in transformers shall not exceed 2% of full load current.

9. IMPEDANCE:

The percentage impedance at rated current at 75°C shall be as under:

S. No.	RATING	percentage impedance at 75°C	Tolerance
1	315 KVA	4.5%	(+/-) 10%

10. TAPPINGS:

No taps are to be provided in these transformers.

11. FREQUENCY:

Transformers shall be designed for normal frequency of 50 Hz, but shall be capable of giving the rated output with the variation of plus/minus (+/-) 5% from the rated frequency.

12. ELECTRICAL CLEARANCES:

(A) EXTERNAL (IN AIR):

Minimum external electrical clearances after mounting the bimetallic terminal connectors in position shall be maintained, as under, however positive tolerance shall be acceptable without any ceiling.

Voltage	Medium	Clearance	
		Phase to phase	Phase to earth
11000 Volt	A I R	255 mm	140 mm
433 Volt	A I R	75 mm	40 mm

B) INTERNAL (IN OIL):

The following minimum internal clearances shall be maintained as per details given hereunder:

PARTICULARS	315 KVA
a) On width side (non bushing side)	25 mm
b) On length side (bushing side HV & LV both)	40 mm
c) Between HV windings & yokes (end insulation)	20 mm
d) Between LV windings to core (Bare conductor)	5 mm
e) From top of yoke to inside of top cover of tank (with gasket)	75 mm
f) Between LV/HV winding (Radial bare conductor Clearance)	11 mm
g) Phase to Phase Clearance between HV limbs	10 mm

The aforesaid external and internal clearances are minimum clearances and no negative tolerance on these clearances shall be allowed.

13. TEST VOLTAGE:

Transformers shall be capable of withstanding the power frequency and impulse test voltage prescribed below:

Nominal system Voltage (RMS)	Highest system voltage (RMS)	Impulse withstand voltage	Power frequency test voltage in (RMS)
11 KV	12 KV	Min .75 KV (PEAK)	28KV
0.433 KV	----	----	3 KV

The Transformer shall have fully insulated windings designed for the above impulse level.

14. HEAT DISSIPATION (COOLING) / RADIATOR CALCULATIONS & E T R /PSR (ELLIPTICAL TUBE RADIATORS) / (PRESSED STEEL RADIATOR) PLACEMENT:

The transformers shall be capable of giving a continuous output without exceeding the specified temperature rise. Only Elliptical tube radiators of section 57 of gauge 18 or **Pressed steel radiator** (with tolerance as per relevant ISS) shall be acceptable on the transformers.

The header pipe connecting radiator bank to the tank shall be rectangular in shape with approximate size of 100x20 mm. The placement of top header pipe to the tank body shall be above the top of yoke, to facilitate cooling for hot oil sump over top yoke.

Cooling area of the tank should be sufficient to dissipate the guaranteed losses satisfactorily . Necessary calculations in this regard shall be furnished by the Bidder with their tender. For the purpose of heat dissipation calculations, the following criteria shall be adopted:

i) Plain surface of tank – 500 W / m²

(Note: The area of top/bottom tank surface, headers, HV/LV bushing pocket and conservator shall not be considered for purpose of above calculations).

ii) Elliptical tube of section 57 -- 55 watts/meter length.

Note:- The provision of radiator is essential in distribution transformers to be supplied against this tender.

15. WINDING AND INSULATION:

i) MATERIALS:

super Enameled/ Double paper covered copper conductors shall be used for 11 KV class transformers of 315 KVA rating. **The covering shall be conformed to applicable ISS.**

ii) CONSTRUCTION:

The High-tension windings shall be concentric with the Low-tension windings. The Arrangement of the windings shall be robust in electrical and mechanical construction and shall permit free circulation of oil and avoid hot spots. The LT conductor shall be rectangular in shape. Two layer of electrical grade insulation craft paper of 2 mil thickness or one layer of min. 4 mil thickness shall be used for interlayer insulation both for HV and LV Coils. Insulation cylinder made from electric grade pre-compressed board(s) having minimum total thickness of 1.5 mm shall be used between HV and LV windings. Alternatively 20 mil pressphan paper making thickness of the cylinder 1.5 mm having similar electrical properties may also be used.

For phase barrier, 2 Nos. of 1 mm thick press board shall be used for covering the tie rods. Besides, tie rods shall be covered by SRBP tubes of suitable size.

2 mm press board shall be used for base support insulation and core clamping channel insulation.

For bottom and top yoke insulation, only PC Board of min. 2 mm thickness will be used.

Also, vertical spacers between HV and LV coils and radial spacers (tickleys)/ blocks etc. shall be of PC Board only.

Top layer of all HV coil shall be given one coat of air dying insulation varnish.

A tolerance of upto plus minus 1% shall be permissible on ID and OD and axial length of HV and LV coils. However, the above tolerances are subject to maintaining the min. required clearances. The material and thickness of various insulation provided for phase barrier, foot plate insulation, yoke insulation and core clamp insulation shall be clearly indicated in the drawing and in any case shall not be inferior to those used in type tested transformers.

Min. number of coils on HV side shall be 6 (six) per phase for each rating transformers. Dovetailed shaped radial spacers shall be placed between HV coil sections, suitably – locked with vertical spacers around the circumference of the coils. The number of such spacers shall be minimum 8(eight).

One No. HV Coli is accepted in case of wound core construction.

Current Density

The current density for HV and LV conductor shall not exceed the value given hereunder:

Rating	Current density in Amp/mm .sq.	
	HV winding	LV winding
315 KVA	2.8	2.8

iii) INSULATION MATERIAL:

Electrical grade insulating Kraft paper of only Triveni / Ballarpur / Padamjee shall be used. Press Board used shall be of senapathy whitely / Raman make. Perma wood or haldu wood blocks shall be used for Top and Bottom yoke insulation.

iv) CONNECTIONS AND TERMINATIONS:

A) HV Winding: The following method shall be adopted for taking out HV connections-

- The coil series connections shall be made by soldering / brazing only, after completely removing the insulation from the ends.
- Starting and finishing leads of HT coils shall be covered with empire sleeve(s) of proper size. These leads should be clamped with the body of the winding with the help of cotton twine during manufacture of the coils.
- All delta leads from the HT coils as well as HT line leads shall be taken out through **multiple paper covered** (MPC) copper wires of sufficient cross section area to impart the desired mechanical strength. The current density in HV lead wire shall not exceed 0.8 A/mm^2 . These lead wires shall be provided with multi layer paper insulation of minimum 1.0 mm thickness i.e. minimum increase in diameter due to paper insulation shall not be less than 2 mm. The layer of glass sleeves/ glass tape shall also be provided on the delta MPC wire and it should be further covered with minimum 12 mm dia SRBP tube. The MPC should also be varnish dipped. The SRBP tube shall be extended in such a way that it is entered upto 50% of bushing height.
- All the above leads shall then be clamped tightly with cotton twine directly on to the special frame/bracket making **“Pie”** shape connection. This structure could be made up of Bakelite/ Permalli wood/ laminated PC board flats, having minimum size of 25x6.0 mm. Line leads leading to the HV bushing terminals shall be directly clamped to the horizontal support bar of the **“Pie”** structure so that any tension which may develop in the HT leads due to jerks or at the time of making the connection , is not passed to the HT coils.
- Delta joint and lead from delta joint to bushing rod shall be made by brazing only.

B) LV Winding :

- The LV connection shall be taken out by cut on the top yoke channel duly reinforced to compensate for the mechanical strength.
- The layers in LV Coil may be either even or odd in numbers but minimum layers shall be two.
- LV star point shall be formed of copper flat of sufficient strength. Leads from winding shall be connected to the flat by brazing.
- Firm connection of LV winding to bushing shall be made of adequate size of **“ L shape flat”**. Connection of LV coils to L shape flat shall be by brazing only.
- “L”** shape Flat shall be clamped to LV Bushing metal part(s) by using nut, lock nut and washer.
- Neutral of the Secondary winding (LV) shall be brought out to a separate insulated bushing .
- For Copper windings, silver brazing rods with suitable flux will be used.

16. CORE CONSTRUCTION & CORE COIL ASSEMBLY DETAILS:

A . CRGO CORE

- The core shall be **stack/ wound type** of high grade cold rolled grain oriented annealed steel laminations, having low loss and good grain properties, coated with hot oil proof insulation, bolted together to the frames firmly to prevent vibration or noise. All core clamping bolts shall be effectively insulated. The complete design of core must ensure the permanency of the core losses with continuous working of the transformers. The value of the flux density allowed in the designs and grade of laminations used shall be clearly stated in the offer, along with the curves. The transformer core shall be constructed out of the prime class of materials. CRGO Lamination used shall be of prime grade and not second grade steel laminations.
- It will be mandatory for all the transformer manufacturers to use only **PRIME grade CRGO Laminations of M-4 grade/ 0.27 mm (with tolerance as per relevant ISS) thickness or better** with specific loss of 0.89 watt per kg. at 1.6 Tesla or any other combination of better grades with any thickness subject to maximum specific loss of 0.89 watt per kg. at 1.6 Tesla will also be acceptable. The bidder shall furnish the core loss (watt/Kg.) and power

(VA/Kg) curves of the laminations used. The core shall be properly stress relieved by annealing in inert atmosphere. The transformer shall be suitable for over fluxing (due to combined effect of voltage and frequency) upto 12.5% without injurious heating. The operating flux density shall be such that there is a clear safe margin over the fluxing limit of 12.5%.

- (iii) Full mitred core construction technique shall be adopted. Top yoke & bottom yoke pieces shall all be in one single piece and no cut pieces shall be acceptable. The cross sectional area of yoke & limb shall be approximately same.
- (iv) The transformer core shall not get saturated for any value of V/f ratio to the extent of 115% of the rated value of V/f ratio (i.e. 11000/ 50) due to combined effect of voltage and frequency without injurious heating at full load conditions. The bidder shall furnish necessary design data in support of this situation.
- (v) Flux density at rated voltage and frequency of core and yoke shall not be more than **1.6 Tesla. The Over fluxing shall be limited to 12.5% of rated value and flux density at 112.5% of rated voltage does not exceed by 1.9 Tesla.**

The No Load Current (magnetising current) of each rating of transformers at rated voltage and at 112.5% of rated voltage shall not exceed the values given below:

Maximum permissible magnetising current in percentage of rated full load current	
At 100% rated voltage 2%	At 112.5% rated voltage 5%

The tolerance on magnetizing current shall be +30% on declared value of magnetizing current as per IS:2026

(vi) For free circulation of oil axial and radial ducts of the following minimum thickness shall be provided:

Width of axial duct in mm in between insulating cylinder and		Radial duct between HV coils in mm
HV winding	LV winding	
5	4	8

Tolerance of ± 1 mm on above axial ducts width shall be allowed provided that total clearance between HV to LV coil (bare conductor) is maintained as minimum 11 mm.

(B). AMORPHOUS METAL CORE

- a) The core shall be high quality amorphous ribbons having very low loss formed into wound cores of rectangular shape, bolted together to the frames firmly to prevent vibration or noise. The complete design of core must ensure permanency of the core loss with continuous working of the transformers. The value of the flux density allowed in the design shall be clearly stated in the offer. Curve showing the properties of the metal shall be attached with the offer.
- b) Core Clamping – Amorphous Metal and CRGO wound core Transformers
 1. Core clamping shall be with top and bottom U-shaped core clamps made of sheet steel clamped with MS tie rods for efficient clamping.
 2. MS core clamps shall be painted with varnish or hot oil resistant paint
 3. Suitable provision shall be made in the bottom core clamp / bottom plate of the transformer to Arrest movement of the active part.
- c) The transformer core shall be suitable for over fluxing due to combined effect of voltage and frequency upto 12.5% without injurious heating at full load conditions and shall not get saturated. The Bidder shall furnish necessary design data in support of this situation.
- d) Flux density should not be more than 1.6 Tesla for Amorphous core. No load current shall not exceed **2%** of full load current and will be measured by energizing the transformer at 433 volts 50 c/s on the secondary. Increase of voltage of 433 volts by 12.5% shall not increase the no load current disproportionately high and shall not exceed i.e., **5%**. Test for magnetic balance by connecting the LV phase by phase to rated phase voltage and measurement of an, bn, cn voltage will be carried out.

NOTE : Equal Weightage shall be given to the transformers with Amorphous metal core and CRGO.

(C) CORE-COIL ASSEMBLY:

The core joints shall be interleaved and with full mitre design, as mentioned above. Ample provision for free circulation of oil in the radial gap between the core & LV coils shall be made. Eyes or lugs of sufficient size shall be provided for lifting

core and winding assembly out of the tank. The core shall be effectively earthed through **tinned copper earthing plate** bolted on core frame channels, after removing the channel paint.

For top yoke channels, if cut or holes are made for taking LV connections, suitable reinforcement to channels shall be made by providing adequate size of MS Flat of the thickness not less than 6 mm.

On the core-coil assembly, core clamping channels, tie rods, core studs, spacers, assembly base supports, etc. of each rating shall be provided as per details given hereunder:

Sr. No.	Item	Particulars
a)	Tie rods	Minimum 8 Nos. of 16 mm each properly insulated and covered with SRBP tubes. Tie rods shall also be provided with lock nuts.
b)	Core studs	Minimum 8 Nos. of 16 mm each properly insulated and covered with SRBP tubes. The core studs shall also be provided with lock nuts.
c)	Spacers	Minimum 8 Nos. dovetail type with min. peripheral coverage of 30%.
d)	Support of core assembly base	2 Nos. MS channels OF 100x50x6t mm. with minimum peripheral coverage of 40%.
e)	Channels for clamping core coil assembly	4 MS Channels of 100x50x6t mm. size (applicable for CRGO transformers)

Guides on all the four sides shall be provided to prevent shifting of the active parts and thereby accidental touching the tank. Alternatively boss nut arrangement at the top of core coil assembly to lock the same with the transformer tank be provided.

The assembly fixing boss nut(s) are to be welded, 20-30 mm off the centre line (and diagonally) of the tanks, so that assembly shifting during transport etc. is prevented. M S Channel, Tie Rods etc should be painted with hot oil and corrosion resistant paint before use.

In case if above marking is not found on the core assembly of physically opened transformer selected for physical verification during final inspection then no further inspection shall be carried out and re-inspection charges shall be payable by the supplier.

17. TRANSFORMER TANK:

(a) Transformers tank shall be rectangular in shape, robust in construction and with adequate strength to withstand the pressures developed at the time of severe fault conditions. The tank body shall be suitably stiffened to achieve the object. The tank sheet shall be electrically welded both from inside and outside to impart proper mechanical strength and to plug leakage of oil. All joints of tank and fittings shall be oil tight and no bulging shall occur during service. The tank design shall be such that the core and windings can be lifted freely. The tank plates shall be of such strength that the complete transformer when filled with oil may be lifted bodily by means of lifting lugs provided. The stiffeners shall be welded full length. All the welding shall be continuous. The top cover plate shall be sloping down by more than 15 mm, opposite LV bushings side. The top cover shall be extended by 5 mm by all the sides beyond the flange of the top cover. Accordingly length of the lifting hooks shall be extended. The top cover shall have no cut at point of lifting lug. **No negative tolerance in the tank dimensions is acceptable in actual supply.** The tank shall be fabricated by welding at corners. No horizontal or vertical joints in tank side walls and its bottom and top cover will be allowed.

(b) Minimum size of MS Sections to be used in construction of each rating of transformer tanks shall be as under:

Sr.No.	I T E M S	Parameters
1	Tank Cover plate thickness (mm)	5.0 t
2	Tank Sides wall thickness (mm)	4.0 t
3	Tank bottom plate thickness (mm)	5.0 t
4	Conservator body (mm)	3.0 t
5	Detachable Conservator side Cover	N.A.
6	No. of stiffeners (To be welded on four side of the tank in the angle forms inverted "L")	
		315 KVA rating
7	Size of M. S. stiffener (mm)	

	315 KVA rating	40x40x 6 angle
8	Tank Top flange size (mm)	50 x 6 t Flat
9	Cover Bolt Size	As Per IS:1180 Part-1(2014)**
10	Cover Bolt spacings (Maximum)	75 mm
11	Lifting lugs	4 Nos. 10t mm flat
12	Tank Base Channel (ISMC Type) at a C-C distance of 415 mm)	
	315 KVA rating	2 (100x50x6t mm)

* **Tank base channels shall be provided parallel to the bushing lines.**

** All screws, nuts, bolts /washers and fasteners exposed to atmosphere are as per IS 1180 Part-1/2014 as follows :-

- a) Size 12 mm and below:- stainless steel
- b) Above 12 mm:- Steel with suitable finish like electrogalvanized with passivation or hot dip galvanized.

NOTE: Each cover bolt shall be complete with two flat washers, one nut and one spring washer.

- i) The 12 Nos. nuts & bolts (4Nos each on length sides & 2 nos each on widths sides of tank body) to be tag welded on top cover / tank body of the transformer.
- ii) The 04 Nos. Anti Theft Fasteners shall be provided - one each on all four sides in centre of body of transformer. Two holes shall be provided – one on top cover and other on collar of transformer to facilitate providing of 2 Nos. poly-carbonate seals on longitudinal side.

Additional 8 Nos. stainless steel anti theft fasteners (nuts and bolts) used for fixing the base channel on structure shall be provided by the supplier.

The above mentioned M S sections shall be subject to tolerance as per ISS.

MEASUREMENT OF SHEET THICKNESS OF TRANSFORMER TANK:

The following measurements shall be carried out at any authorized (NABL accredited) lab/testing house of Govt of India like ERDA/CPRI or Central Testing Lab at Jaipur of JVVNL on the supplies of distribution transformers (report to be attached along with Tender document):

Measurement of Transformer Tank Thickness may be done as follows:-

1.	Top Cover	At 2 places to be measured & average is to be taken.
2.	Bottom Cover	-do-
3.	Side Wall(s)	On all four sides (average is to be taken)

For transformer tank sheet thickness verification, the average of top and bottom cover be taken collectively and not individually to decide acceptance/ rejection of transformers.

- The nominal value of sheet thickness will be considered as mentioned in the Specification.
- Rolling tolerance will be as per ISS:1852-1985 with latest amendment and no penalty will be charged on such measured thickness till tolerance limit of ISS.
- Sheet thickness of transformer tank for Distribution Transformers as per relevant tender specification are as under for ready reference:

Sr. No.	Rating	Top Cover (mm)	Bottom Cover (mm)	Side of Tank (mm)
1	315 KVA Three Phase	5.0	5.0	4.0

Further it is also intimated that 5% variation beyond tolerance limit in measurement of sheet thickness on negative side may be acceptable with levy of penalty. The rate of penalty will be Rs.80.00 per Kg or as decided by competent authority.

For example:

Weight of 315 KVA Transformer Tank	1200 Kg. (approx.)
Variation in thickness of tank	5% (beyond tolerance limit)
Then penalty levied will be	1200x80x5 = Rs.4800.00

	100

In case any dimension in transformer tank sheet thickness found beyond aforesaid limit of (-) 5% will not be acceptable and the transformer shall stand rejected and it will have to be replaced by the firm.

The highest percentage variation on negative side in respect of measurement of sheet thickness of any part of tank will be applicable on the entire dimensions for levy of penalty.

(c) Lifting Lugs: Four Nos. welded heavy duty lifting lugs of MS plate of 10mm thickness, suitably reinforced by vertical supporting flat welded edge wise below the lug on side wall shall be provided, these shall be so extended that cutting of bent plate is not required

(d) Top cover gasket & Bolt:

- i) The gasket provided in between top cover plate and tank shall be of min. 6 mm thick neoprene rubberized oil resistant cork sheets conforming to type B or C as per IS 4253 part II
- ii) Nut bolts shall be of size M 12 x 40 mm / 4/8x1.5" long with two flat washers, suitably spaced (as specified) to press the cover.
- iii) Height of the tank shall be such that minimum clear height is to be achieved between top of yoke and under side of the tank cover (with gasket in place) as under:
 - a) 315 KVA rating - 75 mm
- iv) All screws, nuts, bolts/washers and fasteners exposed to atmosphere are as per IS 1180 Part-1/2014 as follows :-
 - c) Size 12 mm and below:- stainless steel
 - d) Above 12 mm:- Steel with suitable finish like electrogalvanized with passivation or hot dip galvanized.
- v) All sealing washers / gaskets shall be made of oil and heat resistant neoprene or nitrile rubber. Gaskets made of natural rubber sheet are not permissible. The minimum thickness of gaskets shall not be less than 6 mm for tank cover and 4mm for HT/LT gasket washers.
- vi) Talbros make neoprene/nitrile based rubberized cork sheet – grade RC-70-C shall only be used as gasket material. Alternatively, other makes of gaskets having type designations as under can also be used, if 'Talbro's' make gasket is not available:

S. No.	Name of the firm	Commercial name of gasket manufactured by the firm.
1.	M/s. Nu-Cork Products P. Ltd. Gurgaon	Nu-Cork (Neoprene) Nu-Cork 999 RC-70-C
2.	M/s. Bharat Corrub Ind. Vadodara	Chetak (Neoprene) RC-70-C
3.	M/s. Grindbeck. Gujarat	Zebra (Neoprene) RC-70-C
4.	M/s Goodwill Rubber Ind. (P) Ltd., Calcutta.	Mayur (Neoprene) RC-70C
5.	M/s Pristine Technologies & Industries, Jaipur.	VIN CORK-CO1(Type- C, RC 70-C)

(e) Tank shall be reinforced by continuously welded angle on all the four sides of the walls, on the edge of tank, as specified above. The permanent deflection shall not be more than 5 mm upto 750 mm length and 6.5 mm upto 1250 mm length when transformer tank without oil is subjected to the vacuum of 500 mm of Mercury.

f). PAINTING & FINISHING:

Steel surface shall be prepared by sand / shot blast or chemical cleaning including phosphating, as per IS 3618. Inside of tank shall be painted with varnish or oil resistance paint. For external surface, one coat of thermo-setting powder paint or one coat of epoxy primer followed by 2 coat of polyurethane base paint of olive green colour confirming to shade No. 220 of IS: 5-1961 to be applied in order to distinguish of star level transformers. Total Dry film thickness as per IS 1180 Part-1 2014.

The requirement for paint and the material and Dry film thickness to be used as below.

Paint Type	Area to be Painted	No. of coats	Total Dry film thickness (min.)
a) Thermo setting powder paint	Inside	01	30 microns
	Outside	01	60 microns
LIQUID PAINT			
a) Epoxy (Primer)	Outside	01	30 microns
b) Polyurethane (finish coat)	Outside	02	25 microns each
c) Hot Oil resistant Paint/varnish	Inside	01	35/10 microns

18. FITTINGS & ACCESSORIES:

“The following standard fittings shall be provided on each transformer:

- a) Earthing terminals of M12x40L/ 4/8x1.5” with tinned lugs and symbol – (2 Nos.)
- b) Lifting lugs – (4 Nos. for main tank).
- c) Rating and terminal marking plate (non-detachable), details to be included in one plate only. The plate shall be of **stainless steel** only, with details clearly marked - (1 No.)
- d) Bi-metallic terminal connectors on HV bushings and L-type connectors on LV bushing shall be fitted before dispatch.
- e) Oil level gauge of minimum 150 mm length of prismatic glass, indicating three positions of oil, marked as follows, shall be provided:

1)	-5 °C - Min.
2)	30 °C - Nor.
3)	90 °C – Max.

- f) Silica Gel Breather shall be aluminium/ metal – (1 No.)
- g) Thermometer pocket, 12.5 mm dia with cap. shall be provided — (1 No.)
- h) Oil filling hole (1/4”dia) with cover and gun metal drain valve of 20 mm size on the oil conservator.
- i)
 - a) One filter valve of gun metal of 20 mm size at the top side of the tank.
 - b) One drain cum sampling cum filter valve of **Steel** at the bottom side of the tank but opposite of the top filter valve. The necessary arrangement for locking on this valve by providing MS Sheet box duly welded on tank body shall be made.
 - c) The valve shall be either of Leder or L&T or AUDCO make and wheel type.
- j) **HV Bushings.** These shall be of 17.5 KV/250 A class, porcelain/ polycrate with non adjustable, single gap type arcing horns – (3 Nos.)
- k) **LV Bushings.** 1.1 KV class: (4 Nos.)
 - a) 630 A (M 20 stem) – for 315 KVA rating.
- l) Brass rod 12 mm diameter for HT Terminals of each rating – (3 Nos.)
- m) Brass rod for LT Terminals of each rating – (4 Nos.)
 - a) 20 mm diameter for 315 KVA rating transformer
- n) 100 mm dial type thermometer for oil temperature indication.
- o) Two pulling eyes one each on opposite side of the tank.
- p) Explosion vent (pressure relief valve) and pipe connected with conservator.
- q) Air release device.

Note:

1. As mentioned above, suitable bi-metallic connectors on HV bushing and L-type connector shall be provided, having capacity of about 1.5 times the rated current of the transformer
2. LV/ HV Connector shall not be the integral part of the bushing stems”.

19. CONSERVATOR:

When a conservator is fitted, the oil gauge and the breathing device shall be fixed to the conservator. In addition, the cover of the main tank shall be provided with a self-sealing pressure release device designed to operate at minimum pressure of 8 PSI (0.564 Kg./cm. Sq.) to enable release of air trapped within the main tank, unless the conservator is so located as to eliminate the possibility of air being trapped within the main tank. The conservator shall be of cylindrical shape and it should be provided above the HV bushing with a minimum clearance of 50 mm and suitably inclined to maintain the clearance.

The total inner volume of conservator shall be minimum of 10% of the volume of oil in each rating of transformer. The inside diameter of the pipe connecting the conservator to a main tank shall be min. of 50 mm and it should be projected into conservator in such a way that its end is approximately 25 mm above the bottom of conservator so as to create a sump for collection of impurities. The min. oil level (corresponding to – 5 deg. C.) should be above the sump level. The connecting pipe from conservator tank to main tank shall have a sloping flap so that oil falling from pipe shall not fall directly on the active job.

The oil filling hole cap of conservator should be welded with tank body with the help of suitable inverted ‘U’ shape clamp.

20. SILICAGEL BREATHER:

Body of breather shall be of aluminium/ metal and inside container for Silica gel shall be of tin sheet. The breather shall be only from reputed and approved manufacturer and as per the approved drawing. The gel capacity shall be of 500 grams. Inverted U shape pipe shall be used for breather. Mounting arrangement of the breather shall be flanged/ threaded type as per details given in the illustrative drawing attached.

The design shall be such that the condition of Silica gel is clearly visible from a distance, even after years of service.

21. H V BUSHING TERMINAL DETAILS :

The transformer shall be provided with outdoor type 3 Nos. 17.50 KV / 250 A class porcelain bushings, conforming to IS:3347/1972 & IS:2099/1973 from the manufacturer of repute. The HV bushings shall be on top of the tank and shall be fitted on a pocket made on top cover. These pockets shall be such that the HV bushing is tilted more towards the HV side. The bushing of R & B may also be tilted sidewise to maintain the required electrical clearance. The bushings rods and nuts shall be made of brass. The inner porcelain portion of the bushing shall be projected about 50% of the length inside the bushing pocket. **HT bushing(s) mounting bolts should be tag welded.**

The clamping ring of HV bushing shall be of galvanised MS Sheet having minimum thickness of 1.6 mm. The total weight of all the 12 aluminium caste member of HV bushing shall not be less than 210 grams.

The arcing horn(s) shall be single gap and fixed type. HV bushings shall be of reputed make such as BEPCO, JAYSHREE, WSI, SESHASAYEE, JAIPUR GLASS, BPPL Bikaner, Agarwal salt Co. Bikaner, Baid Sanitary Works, Bikaner/ Krishna Ceramics, Nasirabad or any other make - approved by the purchaser. The HV bushings shall generally conform to IS: 3347 and IS: 2099. Embossing showing the manufacturer's name and month & year of manufacture shall be clearly visible on HV bushings, even after fixing on transformer(s).

22. L V BUSHING TERMINAL DETAILS:

“LV Bushing side shall be on side of the tank but opposite to the HV Bushing side. 4 Nos. LV Bushings (1.1 KV/630 A for 315 KVA rating transformers) shall be mounted on the tank wall. Projection of the LV pocket shall be such that inner portion of the LV stem shall not project more than 20 mm inside the tank, to facilitate unhindered lifting of the core coil assembly. Bushing stem of M 20 & M 30 size shall be of brass respectively. Rest of the components shall conform to the requirement of IS:3347 (Part I/section 2). The LV bushings shall be of reputed make such as JSI, JAIPUR GLASS, BPPL Bikaner, Baid Sanitary Works, Bikaner, Agarwal salt Co. Bikaner, or any other make approved by the purchaser. The LV bushings shall generally conform to IS: 3347 and IS: 7421”.

23. TRANSFORMER OIL:

The transformer shall be supplied complete with first filling of EHV Grade transformer oil, up to the normal oil level. The oil shall conform to IS: 335-1993 (latest amended) and should be ISI Marked and having the specified aging characteristics.

The make of Transformer Oil shall be either APAR/SAVITA/ RAJ LUBRICANTS/ ANAMIKA/SHARAVATI/ MADRAS PETRO/ RAJ PETROL/ LUBRICHEM, MUMBAI/ OPANAMA PETROCHEM, ANKELSHWAR/ TASHKENT OIL, VADODARA/ COLUMBIA. The transformer oil sample taken from the transformer shall be subject to testing as per provisions of IS:1866 and report be submitted with tender document.

The oil manufacturer's test certificate shall be submitted along with tender document.

24. IDENTIFICATION DETAILS:

A) Rating & terminal marking plate: Each Transformer shall be provided with non detachable name, rating and terminal marking plate fitted in a visible position. All details shall be given on one plate. Material of the plate shall be stainless steel only. Thickness shall be 0.9 mm (with a tolerance of ± 0.1 mm). The plate shall be made absolutely undetectable either through welding or riveting or through any other approved method.

Each HV & LV terminal shall be duly marked with its terminal numbers. (e.g. HV terminal with capital letter 1U, 1V, 1W and LV terminal by corresponding small letters) 2u, 2v, 2w and the neutral terminal by 2n). In the diagram to be given on the name plate, the relative position of various terminals- when viewed from top – shall be clearly shown.

Besides other particulars, following details shall also be given on the name plate:

- i. P.O. No. - month & year.
- ii. Date of despatch - month & year
- iii. Date of expiry of guarantee period – month & year
- iv. Maximum Guaranteed Loss Figures **at 50% and 100% loading**
- v. Recommended fuse sizes for HV & LV sides.
- vi. Name & Full address of the manufacturer.
- vii. Capacity of the transformer.

- viii. Rating of the transformer.
- ix. Energy Efficient level-2 and Standard IS1180 Part-1

ALL DETAILS ON THE NAME RATING AND DIAGRAM PLATE SHALL BE INDELIBLY MARKED i.e. BY ENGRAVING, STAMPING or PUNCHING.

I) **Identity Plate :-** A M.S. plate of size 75 x 75 x 2.5 mm shall be continuously welded to the main tank body below the middle HV bushing and in clearly visible position, with following details clearly punched :

ICAR- CSWRI, Tender No.

..... KVA

.....MAKE

II) **Identification Mark :-** In addition to above, the following identifying details shall be clearly punched on top cover near lifting lug, towards neutral side, with minimum 10 mm x 10 mm size punch letters.

MAKE _____

Tender No.

The above identification mark shall also be punched / welded to one of the top core clamping channels.

Further following details is to be punched on all the four sides of the tank preferably in center. The dimensions of letters should be 10x10 mm. The punching shall be clearly distinct and visible.

- a) Make
 - b) Tender No.
- B) To punch the details make, Tender No. & Sr.No.of transformer at two places (i.e. at the top cover & transformer tank). The punching shall be distinct and visible.
- C) **Technical Plate-** In addition to existing provision of identity plate and name plate one plate also be affixed on the transformer mentioning the following details:-
- A) Name of the Firm
 - B) TN No.
 - C) Make
 - D) Rating
 - E) Core :-
 - 1. Core Dia
 - 2. Core Area
 - F) LV Coil :-
 - 1. ID/OD Dimensions
 - 2. Conductor Size
 - G) HV Coil :-
 - 1. ID/OD Dimensions
 - 2. Conductor Size
 - H) Limb Centre
 - I) Window Hight

25. GUARANTEED AND OTHER TECHNICAL PARTICULARS FOR TRANSFORMERS:

Guaranteed Technical particulars of the transformers offered shall be furnished in A-4 size paper by the Tenderer in the proforma appended herewith at **Annexure V to VIII** .Complete details shall be furnished. Tolerances on weight quantity and dimension figures shall be $\pm 5\%$ at the tender stage, subject to maintaining the minimum electrical clearances as per the specification. However, no negative tolerance shall be allowed on the short circuit type tested design. Electrical performance data shall be subject to tolerances as per ISS, unless otherwise specified in this specification. However, the Total losses at 50% & 100 % loading shall be maximum guaranteed without any positive tolerance.

26. TYPE TEST CERTIFICATES:

The bidder shall furnish type test certificates of offered design / similar design, (Not older than 5 Years) wherever available, with the bid.

27. DRAWINGS AND OTHER DOCUMENTS:

The tenders shall be accompanied with the following drawings / Calculation sheets, as per the offered designs. The drawings shall be only on A-3 (420 x 297 mm) size paper and calculation sheet shall be on A-4 size paper only.

Name rating / diagram plate drawing.

Outline and general arrangement drawing.

Core-coil assembly drawing.

Core section (for limb and yoke) along with flux density calculation sheet / drawing.

Cooling area calculation sheet.

Thermal Ability short circuit calculation sheet.

Core loss and magnetization curves of the laminations.

Heat dissipation calculations (heat dissipation by tank walls excluding top and bottom should be 500 W/sq.meter.

28. INSPECTION AND TESTING:

The inspection and testing shall be conducted as per relevant clause of the General Conditions of Contract and mentioned elsewhere in tender document. The transformers shall be completely assembled and tested at the factory. The inspection tests as mentioned below are to be carried out by the bidder at any of the Govt of India authorised labs/Testing House or Central Testing Laboratory at Jaipur of JVVNL and reports be attached with the tender document. The costs of these tests are to be borne by the supplier itself. The details of the tests are mentioned below(Reports to be attached with tender document **mandatory**):

29. ROUTINE/ ACCEPTANCE TESTS:

A) 100% testing of the Distribution Transformers shall be carried out at firm's works for measurement of total load losses at 50% & 100 % loading. Remaining testing shall also continue to be carried out as per practice.

The supplier shall invariably furnish manufacturer's routine test certificate along with detailed tests as mentioned below duly done at any Govt of India authorised(NABL accredited) labs/Testing House like ERDA/CPRI or Central Testing Laboratory at Jaipur of JVVNL.

The transformer shall be subjected to the following routine / acceptance tests in accordance with the relevant ISS:

1. Insulation resistance
2. Separate source voltage withstand test
3. Induced over voltage withstand test
4. Measurement of windings resistance cold (at or near the test bed temperature)
5. Measurement of Voltage ratio and check of voltage vector relationship
6. Measurement of Impedance voltage.
7. Measurement of total losses at rated voltage and normal frequency (at 50% & 100% loading).
8. Measurement of No load current at 100 % and 112.5% of rated voltage and normal frequency.
9. Checking of rating and terminal marking plate.
10. **Pressure Test (As per IS 1180 Part-1:2014)**
11. **Oil leakage Test (As per IS 1180 Part-1:2014)**
11. Checking of weights , dimensions, fittings and accessories, tank sheet thickness, oil quantity , material, finish , paint thickness and workmanship as per relevant IS standards/purchase order/contract drawings.
12. Oil dielectric strength (break down voltage) test shall be carried out on the transformers and report to be submitted with tender document.

Following tests shall also be carried out at any Govt of India authorised labs or Central Testing Lab at Jaipur of JVVNL

- i) Over Flux Density Test
- ii) Measurement of unbalance current. (See note below)
- iii) Magnetic Balance Test (See note below)
- iv) Oil Leakage Test (See note below)

NOTE: Also after inspection/ testing, authorised labs/test houses shall affix Signature Seals also on Transformer in addition to other seals.

General Guidelines for various Inspection Tests:

INSULATION RESISTANCE MEASUREMENT:

Insulation resistance of selected transformer shall be measured with a 2500 V Megger, of standard make such as M/s AVO, M/s Sakova, M/s Wako, M/s Evershed, Vignole or Metrawatt. The minimum insulation resistance, in Mega Ohms, shall be as indicated in the table below:

	20 Deg.C.	30 Deg.C.	40 Deg.C	50 Deg.C.	60 Deg.C.
11000 Volts (HV)	800	400	200	100	50
433 Volts (LV)	400	200	100	50	25

ii) PRESSURE TEST (Routine Test):-The transformer with bolted cover shall be tested at an air pressure of 35 KPa above atmosphere pressure maintained inside the tank for 10 min. There should be no leakage at any point.

iii) MAGNETIC BALANCE TEST:

The application of low voltage to the middle limb will induce approximately equal voltages on the two end limbs. The application of voltage to the end limbs will induce greater voltage in the middle limb and less voltage in the other end limb. Uniformity of induced voltages shall confirm the healthiness of the transformer windings.

The procedure for the test shall be as under:

- a) Apply 250 Volts between LV terminals-2u-2n and measure voltages between 2v-2n & 2w-2n.
- b) Apply 250 Volts between 2v-2n and measure voltages between 2u-2n & 2w-2n.
- c) Apply 250 Volts between 2w-2n and measure voltages between 2u-2n & 2v-2n.

The measured voltages shall satisfy the conditions detailed as above.

iv) OIL LEAKAGE TEST (As per IS 1180 Part-1/2014):

The assembled transformer for non-sealed and sealed Type with all fittings including bushing in position shall be tested at a pressure equivalent to twice the normal head measured at the base of tank for 8 hrs. There should be no leakage at any point.

31. TYPE TESTS:

In addition to above tests the following type tests shall be arranged **on transformer only as per IS :1180 (Part-1/2014)** in accordance with IS:2026 (Part I to III).

- i) Short circuit test for dynamic and thermal ability: The short circuit test for dynamic and thermal ability shall be arranged at a Govt. approved/ a Govt. recognized/ NABL accredited laboratory/ILAC i.e. International Laboratory Accredited Laboratory/ ILAC i.e. International Laboratory Accreditation Cooperation (in case of foreign laboratory) on one unit of each rating. The short - circuit test shall be conducted only after successful routine tests including measurement of no-load and load losses.
- ii) Impulse voltage withstand test: The impulse voltage withstand test shall be arranged at any testing house accredited to NABL or a Govt. approved/ a Govt. recognized/ NABL accredited laboratory/ILAC i.e. International Laboratory Accredited Laboratory/ ILAC i.e. International Laboratory Accreditation Cooperation (in case of foreign laboratory) for purpose of impulse test. The test shall be conducted on one unit of each rating to be selected by our inspecting officer from the first lot which shall be of minimum 02 Nos. or 5 % of ordered qty. whichever is more. The test procedure shall conform to the requirement of Clause 13 of IS: 2026 (Part-III). Impulse voltage withstand test shall be of **Min. 75 KVp** The supply shall be accepted only after arranging successful impulse test on the selected transformer(s).

iii) TEMPERATURE RISE TEST : [As per IS 2026 (Part 2)]

Temperature rise test shall be conducted on Maximum measured total loss (No load at rated excitation+Load loss at max. current tap at 75 oC) at 100% loading shall be supplied during temperature rise test at a Govt. approved/ a Govt. recognized/ NABL accredited laboratory/ILAC i.e. International Laboratory Accredited Laboratory/ ILAC i.e. International Laboratory Accreditation Cooperation (in case of foreign laboratory).

The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise. Bids not meeting the above limits of temperature rise will be treated as non responsive.

(iii) PRESSURE TEST:(As per IS 1180 (Part 1):2014)

This test shall be conducted as type test **at a Govt. approved/ a Govt. recognized/ NABL accredited laboratory.**The pressure gauge and vacuum gauge shall be duly calibrated and sealed by an independent recognised test lab(s).

The test procedure shall be as detailed below :

The tank subjected to air pressure of 80 KPa for 30 minutes and vaccume of 500 mm of mercuy for 30 minutes. The Permanent deflection of flat plate, after pressure has been released, shall not exceed the values given below

Length of plate up to	Deflection
750 mm	5.0 mm
751 to 1250 mm	6.5 mm
1251 mm to 1750 mm	8.0 mm
Above 1751 mm	9.0 mm

No extra time shall be allowed for arranging these type tests. The cost of above Type Tests shall be borne by the supplier.

The programmed indicating date and place of type test(s), be intimated enabling purchaser to depute his representative to witness the test if desired. The result of the type test undertaken at the authorized labs/ testing houses of Govt of India or Central Testing Lab at Jaipur of JVVNL.

The requirement of arranging above type tests may however not to be insisted on the suppliers who have arranged the above type tests within last 5 years from the date of opening of this tender on similar design. Minor changes in the present specification may not necessitate repetition of type test(s), if design of core-coil assembly is similar in essential details.

32. RANDOM SELECTION AND TESTING (RST):

32.1 The purchaser may conduct the following type tests, at any test house(s) as mentioned above. The supplier shall arrange these tests including loading, unloading and to & fro transportation from our stores to the test house(s). The charges for such tests shall be reimbursable to the supplier on actual basis on production of documentary evidence in case the selected sample successfully withstand type test(s). In case of otherwise, no charges will be reimbursed.

- i) Short circuit withstand test for Dynamic & Thermal ability. Measurement of No load Loss & Load Loss shall form part of tests conducted before and the after the short circuit test and recorded in the report.
- ii) **Impulse test at Min. 75 KVp.**
- iii) **Temperature rise Test.**
- iv) **Air Pressure Test at 80 KPa for 30 minutes and vacuum of 250 mm of mercury for 30 minutes for transformer upto 200 KVA rating and 80 KPa for 30 minutes and vacuum of 500 mm of mercury for 30 minutes for transformer above 200 KVA rating and upto including 2500 KVA rating as per IS:1180 Part-I:2014.**
- v) Purchaser reserves the right to carry out any site tests he may decide upon at his own expenses. In case equipment/ material are not found as per P.O., all expenses incurred during the testing will be to supplier's account and material shall be replaced by the supplier at site free of cost.

FAILURE IN TYPE TEST(S):

In the event of failure / unsatisfactory results of the transformer(s) in Dynamic & Thermal Ability to withstand Short Circuit Test / impulse type tests/**Temperature rise Test/ Pressure Test**, the supplier shall have to replace the transformer.

No tolerance shall be allowed during CTL testing and in case any parameter which are to be tested in CTL are found beyond guaranteed parameters, the transformer may stand rejected.

If the contractor / supplier fails to lift the material declared rejected or any part thereof from the consignee within a period of 15 days from the date of dispatch of information from the purchaser, the purchaser shall be entitled to effect recovery along with other actions .

33 GUARANTEE PERIOD:

The guarantee period of the transformer should be 60 (sixty) months. Firms shall all possible efforts to make the repair in the institute itself. However, in case the repair is not feasible at the institute, Firms shall have to lift failed Transformer from the stores within 60 days of its intimation positively and deliver the same after repair in next 60 days. In case firm fails to deliver transformer after due repair within 120 days or the time prescribed in the relevant order(permission) for repair, a penalty at the rate of ½% per week subject to maximum 10%, shall be levied for the late delivery of repaired Transformer(s). The repaired transformer may be subject to various tests as the need may be before accepting the same.

II) All the transformers repaired/ rectified by the manufacturer under guarantee clause shall carry a further guarantee of 12 months after repair or unexpired guarantee of 60 months from the date of supply, whichever is later, after repair/ rectification

TECHNICAL SPECIFICATION

FOR

11/0.433 KV, 500 KVA

COPPER WOUND THREE PHASE DISTRIBUTION

TRANSFORMERS OF ENERGY EFFICIENT LEVEL-2 (BEE Star-1)

WITH CRGO (STACK/WOUND)/AMORPHOUS CORE

TECHNICAL SPECIFICATION FOR SUPPLY OF 11/0.433KV, 500 KVA RATING OUTDOOR TYPE (COPPER WOUND) DISTRIBUTION TRANSFORMERS ENERGY EFFICIENT LEVEL-2 (BEE Star-1) AGAINST TN-2496.

1. SCOPE:

This specification covers the design, engineering, manufacture, assembly, inspection and testing at manufacturer's works before supply and delivery at site of Oil immersed, Oil Natural Air Natural (ONAN) outdoor type 11KV/433 V, three phase, 50 Hz, double wound core type, outdoor Type, Copper Wound Distribution Transformers, complete with fittings and accessories for use in Distribution System.

1.1 The Equipment Offered shall be complete with all parts necessary for their effective and trouble free operation. Such parts will be deemed to be within the scope of the supply irrespective of whether they are specifically indicated in the commercial order or not.

1.1.1 It is not the intent to specify herein complete details of design and construction. The equipment offered shall conform to the relevant standards and be of high quality, sturdy, robust and of good design and workmanship complete in all respects and capable to perform continuous and satisfactory operations in the actual service conditions at site and shall have sufficiently long life in service as per statutory requirements. The dimensional drawings attached with this specification and the notes thereto are generally of illustrative nature. In actual practice, notwithstanding any anomalies, discrepancies, omissions, incompleteness, etc. in these specifications and attached drawings, the design and constructional aspects, including materials and dimensions, will be subject to good engineering practice in conformity with the required quality of the product, and to such tolerances, allowances and requirements for clearances etc. as are necessary by virtue of various stipulation in that respect in the relevant Indian Standards, IEC standards, I.E. Rules, I.E Act and other statutory provisions.

1.2 The Tendered / supplier shall bind him to abide by these considerations to the entire satisfaction of the Purchaser and will be required to adjust such details at no extra cost to the purchaser over and above the tendered rates and prices.

1.3 Tolerances on all the dimensions shall be in accordance with provisions made in the relevant Indian/ IEC standards and in these specifications. Otherwise the same will be governed by good engineering practice in conformity with required quality of the product.

2. APPLICABLE STANDARDS:

Unless otherwise modified in the specifications, the Distribution Transformers, including various accessories, shall generally comply with the following Indian Standards / REC Specifications. The standard(s) shall be with latest amendment, if any, from time to time.

Note: Wherever ISS are mentioned, equivalent or better International standards are also acceptable

IS: 1180 Part-1 2014: Specification for outdoor type oil immersed distribution transformers up to and including 2500 KVA,33 KV.

IS:8603:2008 – Dimensions for porcelain transformers bushings for use in heavily polluted atmospheres 12/17.5 kV, 24 kV and 36kV (Amalgamating IS 8603 (Parts 1,2&3) : 1977

IS:2026 (PART-I,II,III,IV & V)/1981 – Power Transformers

IS:6600/1978 : Guide for loading of oil immersed Transformers

IS:335/1983 : New insulation oils for Transformers

IS:3347 (Part-I/Sec. 1 & 2) : Dimension of Porcelain parts & Metal parts for Transformer bushing (1.1 KV).

IS:3347 (PART-III/Sec-1 & 2) : Dimensions of Porcelain parts & Metal parts for Transformer bushing (17.5 KV).

IS:12444 : Specification for copper wire rod.

IS:7421 : Porcelain Transformer Bushings for low voltage – upto 1 KV.

IS:2099/1986 : Porcelain Transformer bushing for AC volts above 1000 volts.
 IS:3639/1966 : Fittings & accessories for Transformers
 IS:1866/1978 : Code of practice for maintenance & supervision of insulating oil in service.
 IS:5484 : Specifications for Aluminium wire rods.
 IS:9335 : Specifications for insulating kraft paper.
 IS:1576 : Specifications for solid insulating press Boards for electrical purposes.
 IS:6162 : (Part I) : Specification for paper covered Aluminium round conductors
 IS:6162 : (Part II) : Specification for paper covered Aluminium rectangular conductors
 IS:104 : Ready mixed paint, brushing zinc chromate, painting
 IS:649 : Testing of steel sheets and strips for magnetic circuits.
 IS:2362 : Determination of water content in oil for porcelain bushing transformers.
 IS: 4257: Dimensions for clamping arrangements for bushings.
 IS:5561: Electrical Power Connector
 IS:6262: Method of test for power factor and di-electric constant of electrical insulating liquids.
 IS:6792: Determination of electrical strength of insulating oil.
 IS 6160 : Rectangular conductor for electrical machines.
 IS:10028 : Selection, Installation and maintenance of transformers
 IS: 3401 : Silicagel
 IS: 5/1961: Colour for ready mixed paints
 REC Specification No. 2
 REC Specification No. 39/1993
 CEA Specification, Chapter 4

Note: - Besides above changes, the technical parameters of the specifications wherever are deviating from the IS:1180 (Part-I/2014) , the same shall be in accordance with IS:1180 (Part-I/2014) and its latest amendments, if any and the changes where the IS:1180 (Part-I/2014) is silent for technical parameters CEA specifications would be governed.

Material conforming to other internationally accepted standards, which ensure equal or higher quality than the standards mentioned above would also be acceptable. 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 Translations shall be furnished along with the offer.

4. SERVICE CONDITIONS:

The distribution transformers to be supplied against this specification shall be suitable for satisfactory continuous operation under the following climatic conditions as per IS 2026 (Part- I) latest revision.

- | | |
|--|----------------------------|
| i) Peak ambient temperature | : 50°C |
| ii) Minimum Ambient Temperature in shade | : -5°C |
| iii) Maximum average ambient temp. in a 24 hours period in shade | : 45°C |
| iv) Maximum yearly weighted average ambient temperature | : 35°C |
| v) Maximum temperature attainable by an object exposed to sun | : 60°C |
| vi) Maximum relative humidity | : 100 % |
| vii) Average number of thunder storm days per annum | : 40 |
| viii) Average number of rainy days per annum | : 120 |
| ix) Average annual rainfall | : 15-100 cm |
| x) Number of months of tropical monsoon conditions | : 4 Months |
| xi) Maximum wind pressure | : 195 Kg/mt ² |
| xii) Altitudes | : Not exceeding 1000 mtrs. |

The equipment shall be for use in moderately hot and humid tropical climate, conducive to rust and fungus growth.

5. PRINCIPAL PARAMETERS:

The Transformers shall be suitable for outdoor installation with three phase 50 Hz 11 KV system in which the neutral is effectively earthed and should be suitable for outdoor service as step down transformers under fluctuations in supply voltage upto plus 10% to minus (-) 15% permissible under Indian Electricity Act and rules there under.

- The transformer shall conform to the following specific parameters:
- | | |
|------------------------------|---------------------------|
| i) Continuous rated capacity | : 500 KVA |
| ii) System Voltage (Max.) | : 12 KV |
| iii) Rated HT voltage | : 11 KV |
| iv) Rated LT voltage | : 433 V (P-P)/250 V (P-N) |
| Line current HV | : 26.25 A |
| Line Current LV | : 666.70 A |

- v) Frequency : 50 Hz
- vi) No. pf phases : THREE
- vii) Primary connection (HT) : DELTA
- viii) Secondary connection (LT) : STAR
- ix) Vector Group : Dyn-11
- x) Percentage impedance at 75°C : 5.0%
- xi) Taps (off circuits) : TAPS ARE NOT REQUIRED.
- xii) Type of cooling : ON AN
- xiii) Fault level of the system : 750 MVA

Primary winding shall be DELTA connected and the secondary winding shall be STAR connected (vector symbol Dyn-11), so as to produce a positive displacement of 30° from the primary to the secondary vectors of the same phase. The neutral of the secondary winding shall be brought out to a separate insulated terminal. The transformers shall be **Copper Wound**.

The transformers shall be designed and constructed to withstand without damage the thermal and dynamic stresses of an external short circuit. The manufacturer / supplier shall furnish all relevant design data and calculations in support of having fulfilled this requirement as stipulated in IS:2026 (Part-I)

5. NO LOAD VOLATGE RATIO:

The No load voltage ratio(s) shall be 11000/ 433 Volts.

6. THE LOSSES:

The total Losses at 50% and 100% loading (at rated voltage and frequency and at 75 deg. C.) shall not exceed the value given below:

RATING (KVA)	MAX. LOSSES AT 50% LOADING (WATTS)	MAX. LOSSES AT 100% LOADING (WATTS)
500	1510	4300

The above specified loss values are maximum guaranteed **as per Energy Efficient level-2 (BEE Star-1)**, without any positive tolerance. In case the actual loss values exceed the above guaranteed values, the transformers shall be rejected at the risk, cost and responsibility of the supplier.

7. TEMPERATURE RISE:

Each transformer shall be capable of operating continuously at its normal rating without exceeding following temperature rise with the above service conditions given in clause-3.

- iii) 40 Deg. C in oil by thermometer.
- iv) 45 Deg. C in winding by resistance

Temperature rise test shall be conducted on Maximum measured total loss (No load at rated excitation+Load loss at max. current tap at 75 oC) at 100% loading shall be supplied during temperature rise test at a Govt. approved/ a Govt. recognized/ NABL accredited laboratory/ILAC i.e. International Laboratory Accredited Laboratory/ ILAC i.e. International Laboratory Accreditation Cooperation (in case of foreign laboratory).

The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise. Bids not meeting the above limits of temperature rise will be treated as non responsive.

It must be noted carefully that readings for hot resistance after shut down shall be taken separately for HV & LV windings, which means, after completing the readings for one winding (HV or LV), the transformer shall be connected again and rated current passed for another 60 minutes (min.) and shut down taken again to take hot resistance readings for the remaining winding. This is in line with the requirement of CBIP manual, to ensure proper resistance v/s time curves.

Hot Spot temperature not to exceed 98 Deg. C when calculated over an annual weighted average ambient temperature of 35 Deg. C as per IS:2026 (Part-II Clause 4.9.4). However, the transformer shall be designed for class 'A' insulation.

8. UNBALANCE CURRENT:

The maximum value of unbalance current in transformers shall not exceed 2% of full load current.

9. IMPEDANCE:

The percentage impedance at rated current at 75°C shall be as under:

S. No.	RATING	percentage impedance at 75°C	Tolerance
1	500 KVA	4.5%	(+/-) 10%

10. TAPPINGS:

No taps are to be provided in these transformers.

11. FREQUENCY:

Transformers shall be designed for normal frequency of 50 Hz, but shall be capable of giving the rated output with the variation of plus/minus (+/-) 5% from the rated frequency.

12. ELECTRICAL CLEARANCES:

(A) EXTERNAL (IN AIR)

Minimum external electrical clearances after mounting the bimetallic terminal connectors in position shall be maintained, as under, however positive tolerance shall be acceptable without any ceiling.

Voltage	Medium	Clearance	
		Phase to phase	Phase to earth
11000 Volt	A I R	255 mm	140 mm
433 Volt	A I R	75 mm	40 mm

(B) INTERNAL (IN OIL):

The following minimum internal clearances shall be maintained as per details given hereunder:

PARTICULARS	500 KVA
a) On width side (non bushing side)	25 mm
b) On length side (bushing side HV & LV both)	40 mm
c) Between HV windings & yokes (end insulation)	20 mm
d) Between LV windings to core (Bare conductor)	5 mm
e) From top of yoke to inside of top cover of tank (with gasket)	100 mm
f) Between LV/HV winding (Radial bare conductor Clearance)	11 mm
g) Phase to Phase Clearance between HV limbs	10 mm

The aforesaid external and internal clearances are minimum clearances and no negative tolerance on these clearances shall be allowed.

13. TEST VOLTAGE:

Transformers shall be capable of withstanding the power frequency and impulse test voltage prescribed below:

Nominal system Voltage (RMS)	Highest system voltage (RMS)	Impulse withstand voltage	Power frequency test voltage in (RMS)
11 KV 0.433 KV	12 KV ----	Min.75 KV (PEAK) ----	28KV 3 KV

The Transformer shall have fully insulated windings designed for the above impulse level.

14. HEAT DISSIPATION (COOLING) / RADIATOR CALCULATIONS & E T R /PSR (ELLIPTICAL TUBE RADIATORS) / (PRESSED STEEL RADIATOR) PLACEMENT:

The transformers shall be capable of giving a continuous output without exceeding the specified temperature rise. Only Elliptical tube radiators of section 57 of gauge 18 or **Pressed steel radiator** (with tolerance as per relevant ISS) shall be acceptable on the transformers.

The header pipe connecting radiator bank to the tank shall be rectangular in shape with approximate size of 100x20 mm. The placement of top header pipe to the tank body shall be above the top of yoke, to facilitate cooling for hot oil sump over top yoke.

Cooling area of the tank should be sufficient to dissipate the guaranteed losses satisfactorily. Necessary calculations in this regard shall be furnished by the Bidder with their tender. For the purpose of heat dissipation calculations, the following criteria shall be adopted:

- i) Plain surface of tank – 500 W / m²
(Note: The area of top/bottom tank surface, headers, HV/LV bushing pocket and conservator shall not be considered for purpose of above calculations).
- ii) Elliptical tube of section 57 -- 55 watts/meter length.

Note:- The provision of radiator is essential in distribution transformers to be supplied against this tender.

15. WINDING AND INSULATION:

i) MATERIALS:

Super Enamelled/ Double paper covered copper conductors shall be used for 11 KV class transformers of 500 KVA rating. **The covering shall be conformed to applicable ISS.**

ii) CONSTRUCTION:

The High-tension windings shall be concentric with the Low-tension windings. The Arrangement of the windings shall be robust in electrical and mechanical construction and shall permit free circulation of oil and avoid hot spots. The LT conductor shall be rectangular in shape. Two layer of electrical grade insulation craft paper of 2 mil thickness or one layer of min. 4 mil thickness shall be used for interlayer insulation both for HV and LV Coils. Insulation cylinder made from electric grade pre-compressed board(s) having minimum total thickness of 1.5 mm shall be used between HV and LV windings. Alternatively 20 mil pressphan paper making thickness of the cylinder 1.5 mm having similar electrical properties may also be used.

For phase barrier, 2 Nos. of 1 mm thick press board shall be used for covering the tie rods. Besides, tie rods shall be covered by SRBP tubes of suitable size.

2 mm press board shall be used for base support insulation and core clamping channel insulation.

For bottom and top yoke insulation, only PC Board of min. 2 mm thickness will be used.

Also, vertical spacers between HV and LV coils and radial spacers (tickleys)/ blocks etc. shall be of PC Board only.

Top layer of all HV coil shall be given one coat of air drying insulation varnish.

A tolerance of upto plus minus 1% shall be permissible on ID and OD and axial length of HV and LV coils. However, the above tolerances are subject to maintaining the min. required clearances. The material and thickness of various insulation provided for phase barrier, foot plate insulation, yoke insulation and core clamp insulation shall be clearly indicated in the drawing and in any case shall not be inferior to those used in type tested transformers.

Min. number of coils on HV side shall be 6 (six) per phase for each rating transformers. Dovetailed shaped radial spacers shall be placed between HV coil sections, suitably – locked with vertical spacers around the circumference of the coils. The number of such spacers shall be minimum 8(eight).

One No. HV Coil is accepted in case of wound core construction.

Current Density

The current density for HV and LV conductor shall not exceed the value given hereunder:

Rating	Current density in Amp/mm .sq.	
	HV winding	LV winding
500 KVA	2.8	2.8

iii) INSULATION MATERIAL:

Electrical grade insulating Kraft paper of only Triveni / Ballarpur / Padamjee shall be used. Press Board used shall be of senapathy whitely / Raman make. Perma wood or haldu wood blocks shall be used for Top and Bottom yoke insulation.

iv) CONNECTIONS AND TERMINATIONS:

D) HV Winding: The following method shall be adopted for taking out HV connections-

- a) The coil series connections shall be made by soldering / brazing only, after completely removing the insulation from the ends.
- b) Starting and finishing leads of HT coils shall be covered with empire sleeve(s) of proper size. These leads should be clamped with the body of the winding with the help of cotton twine during manufacture of the coils.
- e) All delta leads from the HT coils as well as HT line leads shall be taken out through **multiple paper covered (MPC)** copper wires of sufficient cross section area to impart the desired mechanical strength. The current density in HV lead wire shall not exceed 0.8 A/mm^2 . These lead wires shall be provided with multi layer paper insulation of minimum 1.0 mm thickness i.e. minimum increase in diameter due to paper insulation shall not be less than 2 mm. The layer of glass sleeves/ glass tape shall also be provided on the delta MPC wire and it should be further covered with minimum 12 mm dia SRBP tube. The MPC should also be varnish dipped. The SRBP tube shall be extended in such a way that it is entered upto 50% of bushing height.
- f) All the above leads shall then be clamped tightly with cotton twine directly on to the special frame/bracket making **“Pie”** shape connection. This structure could be made up of Bakelite/ Permalli wood/ laminated PC board flats, having minimum size of 25x6.0 mm. Line leads leading to the HV bushing terminals shall be directly clamped to the horizontal support bar of the **“Pie”** structure so that any tension which may develop in the HT leads due to jerks or at the time of making the connection, is not passed to the HT coils.
- e) Delta joint and lead from delta joint to bushing rod shall be made by brazing only.

B) LV Winding :

- a) The LV connection shall be taken out by cut on the top yoke channel duly reinforced to compensate for the mechanical strength.
- b) The layers in LV Coil may be either even or odd in numbers but minimum layers shall be two.
- c) LV star point shall be formed of copper flat of sufficient strength. Leads from winding shall be connected to the flat by brazing.
- d) Firm connection of LV winding to bushing shall be made of adequate size of “L shape flat”. Connection of LV coils to L shape flat shall be by brazing only.
- e) “L” shape Flat shall be clamped to LV Bushing metal part(s) by using nut, lock nut and washer.
- f) Neutral of the Secondary winding (LV) shall be brought out to a separate insulated bushing .
- g) For Copper windings, silver brazing rods with suitable flux will be used.

16. CORE CONSTRUCTION & CORE COIL ASSEMBLY DETAILS:

A . CRGO CORE

(i) The core shall be **stack/ wound type** of high grade cold rolled grain oriented annealed steel laminations, having low loss and good grain properties, coated with hot oil proof insulation, bolted together to the frames firmly to prevent vibration or noise. All core clamping bolts shall be effectively insulated. The complete design of core must ensure the permanency of the core losses with continuous working of the transformers. The value of the flux density allowed in the designs and grade of laminations used shall be clearly stated in the offer, along with the curves. The transformer core shall be constructed out of the prime class of materials. CRGO Lamination used shall be of prime grade and not second grade steel laminations.

(ii) It will be mandatory for all the transformer manufacturers to use only **PRIME grade CRGO Laminations of M-4 grade/ 0.27 mm (with tolerance as per relevant ISS) thickness or better** with specific loss of 0.89 watt per kg. at 1.6 Tesla or any other combination of better grades with any thickness subject to maximum specific loss of 0.89 watt per kg. at 1.6 Tesla will also be acceptable. The bidder shall furnish the core loss (watt/Kg.) and power (VA/Kg) curves of the laminations used. The core shall be properly stress relieved by annealing in inert atmosphere. The transformer shall be suitable for over fluxing (due to combined effect of voltage and frequency) upto 12.5% without injurious heating. The operating flux density shall be such that there is a clear safe margin over the fluxing limit of 12.5%.

(iii) Full mitred core construction technique shall be adopted. Top yoke & bottom yoke pieces shall all be in one single piece and no cut pieces shall be acceptable. The cross sectional area of yoke & limb shall be approximately same.

(iv) The transformer core shall not get saturated for any value of V/f ratio to the extent of 115% of the rated value of V/f ratio (i.e. 11000/ 50) due to combined effect of voltage and frequency without injurious heating at full load conditions. The bidder shall furnish necessary design data in support of this situation.

(v) Flux density at rated voltage and frequency of core and yoke shall not be more than **1.6 Tesla**. The Over fluxing shall be limited to 12.5% of rated value **and flux density at 112.5% of rated voltage does not exceeds by 1.9 Tesla.**

The No Load Current (magnetising current) of each rating of transformers at rated voltage and at 112.5% of rated voltage shall not exceed the values given below:

Maximum permissible magnetising current in percentage of rated full load current	
At 100% rated voltage 2%	At 112.5% rated voltage 5%

The tolerance on magnetizing current shall be +30% on declared value of magnetizing current as per IS:2026

(vi) For free circulation of oil axial and radial ducts of the following minimum thickness shall be provided:

Width of axial duct in mm in between insulating cylinder and		Radial duct between HV coils in mm
HV winding	LV winding	
5	4	8

Tolerance of ± 1 mm on above axial ducts width shall be allowed provided that total clearance between HV to LV coil (bare conductor) is maintained as minimum 11 mm.

(B). AMORPHOUS METAL CORE

a) The core shall be high quality amorphous ribbons having very low loss formed into wound cores of rectangular shape, bolted together to the frames firmly to prevent vibration or noise. The complete design of core must ensure permanency of the core loss with continuous working of the transformers. The value of the flux density allowed in the design shall be clearly stated in the offer. Curve showing the properties of the metal shall be attached with the offer.

b) Core Clamping – Amorphous Metal and CRGO wound core Transformers

1. Core clamping shall be with top and bottom U-shaped core clamps made of sheet steel clamped with MS tie rods for efficient clamping.
2. MS core clamps shall be painted with varnish or hot oil resistant paint
3. Suitable provision shall be made in the bottom core clamp / bottom plate of the transformer to Arrest movement of the active part.

c) The transformer core shall be suitable for over fluxing due to combined effect of voltage and frequency upto 12.5% without injurious heating at full load conditions and shall not get saturated. The Bidder shall furnish necessary design data in support of this situation.

d) Flux density should not be more than 1.6 Tesla for Amorphous core. The Over fluxing shall be limited to 12.5% of rated value and flux density at 112.5% of rated voltage does not exceed by 1.9 Tesla. No load current shall not exceed **2%** of full load current and will be measured by energizing the transformer at 433 volts 50 c/s on the secondary. Increase of voltage of 433 volts by 12.5% shall not increase the no load current disproportionately high and shall not exceed i.e., **5%**. Test for magnetic balance by connecting the LV phase by phase to rated phase voltage and measurement of an, bn, cn voltage will be carried out.

NOTE : Equal Weightage shall be given to the transformers with Amorphous metal core and CRGO.

(C) CORE-COIL ASSEMBLY:

The core joints shall be interleaved and with full mitre design, as mentioned above. Ample provision for free circulation of oil in the radial gap between the core & LV coils shall be made. Eyes or lugs of sufficient size shall be provided for lifting core and winding assembly out of the tank. The core shall be effectively earthed through **tinned copper earthing plate** bolted on core frame channels, after removing the channel paint.

For top yoke channels, if cut or holes are made for taking LV connections, suitable reinforcement to channels shall be made by providing adequate size of MS Flat of the thickness not less than 6 mm.

On the core-coil assembly, core clamping channels, tie rods, core studs, spacers, assembly base supports, etc. of each rating shall be provided as per details given hereunder:

Sr. No.	Item	Particulars
a)	Tie rods	Minimum 8 Nos. of 16 mm each properly insulated and covered with SRBP tubes. Tie rods shall also be provided with lock nuts.
b)	Core studs	Minimum 8 Nos. of 16 mm each properly insulated and covered with SRBP tubes. The core studs shall also be provided with lock nuts.
c)	Spacers	Minimum 8 Nos. dovetail type with min. peripheral coverage of 30%.
d)	Support of core assembly base	2 Nos. MS channels OF 100x50x6t mm. with minimum peripheral coverage of 40%.
e)	Channels for clamping core coil assembly	4 MS Channels of 100x50x6t mm. size (applicable for CRGO transformers)

Guides on all the four sides shall be provided to prevent shifting of the active parts and thereby accidental touching the tank. Alternatively boss nut arrangement at the top of core coil assembly to lock the same with the transformer tank be provided.

The assembly fixing boss nut(s) are to be welded, 20-30 mm off the centre line (and diagonally) of the tanks, so that assembly shifting during transport etc. is prevented. M S Channel, Tie Rods etc should be painted with hot oil and corrosion resistant paint before use.

All core-coil assembly shall be indelibly marked / punched on core channel / a identity plate welded on core channel with following details:

1. Name of Supplier:
2. Purchase Order No:
3. Rating:
4. Tender No.:

In case if above marking is not found on the core assembly of physically opened transformer selected for physical verification during final inspection then no further inspection shall be carried out and re-inspection charges shall be payable by the supplier.

17. TRANSFORMER TANK:

- (a) Transformer tank shall be rectangular in shape, robust in construction and with adequate strength to withstand the pressures developed at the time of severe fault conditions. **The tank body shall be suitably stiffened with two stiffeners of size 50x50x6 mm angle. The edge of the angle shall be continuously welded full length with the tank cover body as per drawing enclosed at Annexure-A** The tank sheet shall be electrically welded both from inside and outside to impart proper mechanical strength and to plug leakage of oil. All joints of tank and fittings shall be oil tight and no bulging shall occur during service. The tank design shall be such that the core and windings can be lifted freely. The tank plates shall be of such strength that the complete transformer when filled with oil may be lifted bodily by means of lifting lugs provided. All the welding shall be continuous. The top cover plate shall be sloping down by **more than 15 mm**, opposite LV bushings side. **The top cover edge shall be bent in such a manner which covers the gasket.**

Accordingly length of the lifting hooks shall be extended. The top cover shall have no cut at point of lifting lug. **No negative tolerance in the tank dimensions is acceptable in actual supply.** The tank shall be fabricated by welding at corners. **The bottom plate shall be extended at least by 5 mm outside on all sides to facilitate proper welding with the vertical tank walls as per drawing enclosed at Annexure-A.** No horizontal or vertical joints in tank side walls and its bottom and top cover will be allowed.

- (b) Minimum size of MS Sections to be used in construction of each rating of transformer tanks shall be as under:

Sr.No.	I T E M S	Parameters
1	Tank Cover plate thickness (mm)	5.0 t
2	Tank Sides wall thickness (mm)	4.0 t
3	Tank bottom plate thickness (mm)	5.0 t
4	Conservator body (mm)	3.0 t
5	Detachable Conservator side Cover	N.A.
6	No. of stiffeners (To be welded on four side of the tank in the angle forms inverted "L")	
	500 KVA rating	2 Nos.

7	Size of M. S. stiffener (mm)	
	500 KVA rating	50x50x 6 angle
8	Tank Top flange size (mm)	50 x 6 t Flat
9	Cover Bolt Size	As Per IS:1180 Part-1(2014)**
10	Cover Bolt spacings (Maximum)	75 mm
11	Lifting lugs	4 Nos. 10t mm flat
12	Tank Base Channel (ISMC Type) at a C-C distance of 415 mm)	
	500 KVA rating	2 (125x65x6t mm)

* **Tank base channels shall be provided parallel to the bushing lines.**

** All screws, nuts, bolts /washers and fasteners exposed to atmosphere are as per IS 1180 Part-1/2014 as follows :-

e) Size 12 mm and below:- stainless steel

Above 12 mm:- Steel with suitable finish like electrogalvanized with passivation or hot dip galvanized

NOTE: Each cover bolt shall be complete with two flat washers, one nut and one spring washer.

iii) The 12 Nos. nuts & bolts (4Nos each on length sides & 2 nos each on widths sides of tank body) to be tag welded on top cover / tank body of the transformer.

iv) The 04 Nos. Anti Theft Fasteners shall be provided - one each on all four sides in centre of body of transformer. Two holes shall be provided – one on top cover and other on collar of transformer to facilitate providing of 2 Nos. poly-carbonate seals on longitudinal side.

Additional 8 Nos. stainless steel anti theft fasteners (nuts and bolts) used for fixing the base channel on structure shall be provided by the supplier.

The above mentioned M S sections shall be subject to tolerance as per ISS.

MEASUREMENT OF SHEET THICKNESS OF TRANSFORMER TANK:

The following measurements shall be carried out at any authorized (NABL accredited) lab/testing house of Govt of India like ERDA/CPRI or Central Testing Lab at Jaipur of JVVNL on the supplies of distribution transformers (report to be attached along with Tender document):

Measurement of Transformer Tank Thickness shall be done as follows:-

1.	Top Cover	At 2 places to be measured & average is to be taken.
2.	Bottom Cover	-do-
3.	Side Wall(s)	On all four sides (average is to be taken)

For transformer tank sheet thickness verification, the average of top and bottom cover be taken collectively and not individually to decide acceptance/ rejection of transformers.

· The nominal value of sheet thickness will be considered as mentioned in the Specification.

·· Rolling tolerance will be as per ISS:1852-1985 with latest amendment and no penalty will be charged on such measured thickness till tolerance limit of ISS.

··· Sheet thickness of transformer tank for Distribution Transformers as per relevant tender specification are as under for ready reference:

Sr. No.	Rating	Top Cover (mm)	Bottom Cover (mm)	Side of Tank (mm)
1	500 KVA Three Phase	5.0	5.0	4.0

Further it is also intimated that 5% variation beyond tolerance limit in measurement of sheet thickness on negative side may be acceptable by the competent authority with levy of penalty. The rate of penalty will be Rs.80.00 per Kg or as decided by competent authority.

For example:

Weight of 500 KVA Transformer Tank	1200 Kg. (approx.)
Variation in thickness of tank	5% (beyond tolerance limit)
Then penalty levied will be	1200x80x5 = Rs.4800.00
	----- 100

In case any dimension in transformer tank sheet thickness found beyond aforesaid limit of (-) 5% will not be acceptable to the Discom and the relevant sub-lot shall stand rejected and the lot of such transformers will have to be replaced by the firm.

The highest percentage variation on negative side in respect of measurement of sheet thickness of any part of tank will be applicable on the entire dimensions for levy of penalty.

(c) Lifting Lugs: Four Nos. welded heavy duty lifting lugs of MS plate of 10mm thickness, suitably reinforced by vertical supporting flat welded edge wise below the lug on side wall shall be provided, these shall be so extended that cutting of bent plate is not required

(d) Top cover gasket & Bolt:

- v) The gasket provided in between top cover plate and tank shall be of min. 6 mm thick neoprene rubberized oil resistant cork sheets conforming to type B or C as per IS 4253 part II
- vi) G.I. Nut bolts shall be of size M 12 x 40 mm / 4/8x1.5” long with two flat washers, suitably spaced (as specified) to press the cover.
- vii) Height of the tank shall be such that minimum clear height is to be achieved between top of yoke and under side of the tank cover (with gasket in place) as under:
 - a) 500 KVA rating - 100 mm
 - vii) All screws, nuts, **bolts/washers** and fasteners exposed to atmosphere are as per IS 1180 Part-1/2014 as follows :-
 - f) Size 12 mm and below:- stainless steel
 - g) Above 12 mm:- Steel with suitable finish like electrogalvanized with passivation or hot dip galvanized.
- viii) All sealing washers / gaskets shall be made of oil and heat resistant neoprene or nitrile rubber. Gaskets made of natural rubber sheet are not permissible. The minimum thickness of gaskets shall not be less than 6 mm for tank cover and 4mm for HT/LT gasket washers.
- ix) Talbros make neoprene/nitrile based rubberized cork sheet – grade RC-70-C shall only be used as gasket material. Alternatively, other makes of gaskets having type designations as under can also be used, if ‘Talbros’ make gasket is not available:

S. No.	Name of the firm	Commercial name of gasket manufactured by the firm.
1.	M/s. Nu-Cork Products P. Ltd. Gurgaon	Nu-Cork (Neoprene) Nu-Cork 999 RC-70-C
2.	M/s. Bharat Corrub Ind. Vadodara	Chetak (Neoprene) RC-70-C
3.	M/s. Grindbeck. Gujarat	Zebra (Neoprene) RC-70-C
4.	M/s Goodwill Rubber Ind. (P) Ltd., Calcutta.	Mayur (Neoprene) RC-70C
5.	M/s Pristine Technologies & Industries, Jaipur.	VIN CORK-CO1(Type- C, RC 70-C)

(e) Tank shall be reinforced by continuously welded angle on all the four sides of the walls, on the edge of tank, as specified above. The permanent deflection shall not be more than 5 mm upto 750 mm length and 6.5 mm upto 1250 mm length when transformer tank without oil is subjected to the vacuum of 250 mm of Mercury.

f). PAINTING & FINISHING:

Steel surface shall be prepared by sand / shot blast or chemical cleaning including phosphating, as per IS 3618. Inside of tank shall be painted with varnish or oil resistance paint. For external surface, one coat of thermo-setting powder paint or one coat of epoxy primer followed by 2 coat of polyurethane base paint of olive green colour confirming to shade No. 220 of IS: 5-1961 to be applied in order to distinguish of star level transformers. Total Dry film thickness as per IS 1180 Part-1 2014.

The requirement for paint and the material and Dry film thickness to be used as below.

Paint Type	Area to be Painted	No. of coats	Total Dry film thickness (min.)
a) Thermo setting powder paint	Inside	01	30 microns
	Outside	01	60 microns
LIQUID PAINT			
a) Epoxy (Primer)	Outside	01	30 microns
b) Polyurethane (finish coat)	Outside	02	25 microns each
	c) Hot Oil resistant Paint/varnish	Inside	01

All steel screws, nuts, bolts and fasteners exposed to atmosphere as per IS 1180 Part-1/2014.

18. FITTINGS & ACCESSORIES:

“The following standard fittings shall be provided on each transformer:

- r) Earthing terminals of M12x40L/ 4/8x1.5” with tinned lugs and symbol – (2 Nos.)
- s) Lifting lugs – (4 Nos. for main tank).
- t) Rating and terminal marking plate (non-detachable), details to be included in one plate only. The plate shall be of **stainless steel/Aluminium** only, with details clearly marked - (1 No.)
- u) Bi-metallic terminal connectors on HV bushings and L-type connectors on LV bushing shall be fitted before dispatch.
- v) Oil level gauge of minimum 150 mm length of prismatic glass, indicating three positions of oil, marked as follows, shall be provided:

1)	-5 °C - Min.
2)	30 °C - Nor.
3)	90 °C – Max.

- w) **Free Air Type Breather** – (1 No.)
- x) Thermometer pocket, 12.5 mm dia with cap. shall be provided — (1 No.)
- y) Oil filling hole (1/4”dia) with cover and gun metal drain valve of 20 mm size on the oil conservator.
- z) a) One filter valve of gun metal of 20 mm size at the top side of the tank.
b) One drain cum sampling cum filter valve of **Steel** at the bottom side of the tank but opposite of the top filter valve. The necessary arrangement for locking on this valve by providing MS Sheet box duly welded on tank body shall be made.
c) The valve shall be either of Leder or L&T or AUDCO make and wheel type.
- aa) **HV Bushings**. These shall be of 17.5 KV/250 A class, porcelain/ polycrate with non adjustable, single gap type arcing horns – (3 Nos.)
- bb) **LV Bushings**. 1.1 KV class: (4 Nos.)
b) 1000 A (M 30 stem) – for 500 KVA rating.
- cc) Brass rod 12 mm diameter for HT Terminals of each rating – (3 Nos.)
- dd) Brass rod for LT Terminals of each rating – (4 Nos.)
b) 30 mm diameter for 500 KVA rating transformer
- ee) 100 mm dial type thermometer for oil temperature indication.
- ff) Two pulling eyes one each on opposite side of the tank.
- gg) Explosion vent (pressure relief valve) and pipe connected with conservator.
- hh) Air release device.

Note:

- 3. As mentioned above, suitable bi-metallic connectors on HV bushing and L-type connector shall be provided, having capacity of about 1.5 times the rated current of the transformer
- 4. LV/ HV Connector shall not be the integral part of the bushing stems”.

19. CONSERVATOR:

When a conservator is fitted, the oil gauge and the breathing device shall be fixed to the conservator. In addition, the cover of the main tank shall be provided with a self-sealing pressure release device designed to operate at minimum pressure of 8 PSI (0.564 Kg./cm. Sq.) to enable release of air trapped within the main tank, unless the conservator is so located as to eliminate the possibility of air being trapped within the main tank. The conservator shall be of cylindrical shape and it should be provided above the HV bushing with a minimum clearance of 50 mm and suitably inclined to maintain the clearance.

The total inner volume of conservator shall be minimum of 10% of the volume of oil in each rating of transformer. The inside diameter of the pipe connecting the conservator to a main tank shall be min. of 50 mm and it should be projected into conservator in such a way that its end is approximately 25 mm above the bottom of conservator so as to create a sump for collection of impurities. The min. oil level (corresponding to – 5 deg. C.) should be above the sump level. The connecting pipe from conservator tank to main tank shall have a sloping flap so that oil falling from pipe shall not fall directly on the active job.

The oil filling hole cap of conservator should be welded with tank body with the help of suitable inverted ‘U’ shape clamp.

20.0 FREE AIR TYPE BREATHER:

The breather shall be only from reputed and approved manufacturer and as per the approved drawing. Inverted 'U' shape pipe shall be used for breather. Mounting arrangement of the breather shall be flanged/threaded type as per details given in the illustrative drawing attached

21.0 **H V BUSHING TERMINAL DETAILS :**

The transformer shall be provided with outdoor type 3 Nos. 17.50 KV / 250 A class porcelain bushings, conforming to IS:3347/1972 & IS:2099/1973 from the manufacturer of repute. The HV bushings shall be on top of the tank and shall be fitted on a pocket made on top cover. These pockets shall be such that the HV bushing is tilted more towards the HV side. The bushing of R & B may also be tilted sidewise to maintain the required electrical clearance. The bushings rods and nuts shall be made of brass. The inner porcelain portion of the bushing shall be projected about 50% of the length inside the bushing pocket. **HT bushing(s) mounting bolts should be tag welded.**

The clamping ring of HV bushing shall be of galvanised MS Sheet having minimum thickness of 1.6 mm. The total weight of all the 12 aluminium caste member of HV bushing shall not be less than 210 grams.

The arcing horn(s) shall be single gap and fixed type. HV bushings shall be of reputed make such as BEPCO, JAYSHREE, WSI, SESHASAYEE, JAIPUR GLASS, BPPL Bikaner, Agarwal salt Co. Bikaner, Baid Sanitary Works, Bikaner/ Krishna Ceramics, Nasirabad, ADPRO or any other make - approved by the purchaser. The HV bushings shall generally conform to IS: 3347 and IS: 2099. Embossing showing the manufacturer's name and month & year of manufacture shall be clearly visible on HV bushings, even after fixing on transformer(s).

22.0 **L V BUSHING TERMINAL DETAILS:**

"LV Bushing side shall be on side of the tank but opposite to the HV Bushing side. 4 Nos. LV Bushings (1.1 KV/ 1000 A for 500 KVA rating transformers) shall be mounted on the tank wall. Projection of the LV pocket shall be such that inner portion of the LV stem shall not project more than 20 mm inside the tank, to facilitate unhindered lifting of the core coil assembly. Bushing stem of M 20 & M 30 size shall be of brass respectively. Rest of the components shall conform to the requirement of IS:3347 (Part I/section 2). The LV bushings shall be of reputed make such as BEPCO, JAYSHREE, WSI, SESHASAYEE, JAIPUR GLASS, BPPL Bikaner, Agarwal salt Co. Bikaner, Baid Sanitary Works, Bikaner/ Krishna Ceramics, Nasirabad, ADPRO or any other make - approved by the purchaser. The LV bushings shall generally conform to IS: 3347 and IS: 7421".

23.0 **TRANSFORMER OIL:**

The transformer shall be supplied complete with first filling of EHV Grade transformer oil, up to the normal oil level. The oil shall conform to IS: 335-1993 (latest amended) and should be ISI Marked and having the specified aging characteristics.

The make of Transformer Oil shall be either APAR/SAVITA/ RAJ LUBRICANTS/ ANAMIKA/SHARAVATI/ MADRAS PETRO/ RAJ PETROL/ LUBRICHEM, MUMBAI/ OPANAMA PETROCHEM, ANKELSHWAR/ TASHKENT OIL, VADODARA/ COLUMBIA. The transformer oil sample taken from the transformer shall be subject to testing as per provisions of IS:1866.

The oil manufacturer's test certificate shall be attached with the tender document

24. **IDENTIFICATION DETAILS:**

A. Rating & terminal marking plate: Each Transformer shall be provided with non detachable name, rating and terminal marking plate fitted in a visible position. All details shall be given on one plate. Material of the plate shall be stainless steel/aluminium only. Thickness shall be 0.9 mm (with a tolerance of ± 0.1 mm). The plate shall be made absolutely undetectable either through welding or riveting or through any other approved method.

Each HV & LV terminal shall be duly marked with its terminal numbers. (e.g. HV terminal with capital letter 1U, 1V, 1W and LV terminal by corresponding small letters) 2u, 2v, 2w and the neutral terminal by 2n). In the diagram to be given on the name plate, the relative position of various terminals- when viewed from top – shall be clearly shown. Inspection shall not be undertaken unless all these details are verified by the Inspecting Officer.

Besides other particulars, following details shall also be given on the name plate:

- i) P.O. No. - Month & year.
- ii) Date of despatch - month & year
- ii) Date of expiry of guarantee period – month & year
- iii) Maximum Guaranteed Losses at 50% loading & at 100% loading.
- iv) Recommended fuse sizes for HV & LV sides.
- v) Name & Full address of the manufacturer.
- vi) Capacity of the transformer.

- vii) Rating of the transformer.
- viii) Type – Oil filled naturally cooled.
- ix) **IS 1180 part-1/2014.**
- x) **BIS Level-2 with BIS Licence No.**

ALL DETAILS ON THE NAME RATING AND DIAGRAM PLATE SHALL BE INDELIBLY MARKED i.e. BY ENGRAVING, STAMPING or PUNCHING.

B. Technical cum Identification Plate - M.S. plate of size 125 x 75 x 2.5 mm having following details punched with letters of size 8mm X 6mm shall be continuously welded to the main tank body below the middle HV bushing in clearly visible position:-

- J) Name of the Firm
- K) Tender No.
- L) Make
- M) Rating
- N) **Date of Dispatch**
- O) **Date of Expiry of G. P.**
- P) Core :-
 - 1. Core Dia
 - 2. Core Area
- Q) LV Coil :-
 - 1. ID/OD Dimensions
 - 2. Conductor Size
- R) HV Coil :-
 - 1. ID/OD Dimensions
 - 2. Conductor Size
- S) Limb Centre
- T) Window Height

Further following details is to be embossed on the width side of the tank preferably in centre opposite to Name & Rating Plate. The dimensions of letters should be 10x10x1 mm. The punching shall be distinct and visible.

MAKE _____
Tender N _____

The details of Make, TN No.& Sr. No. of transformer shall also be punched on the top cover. The punching shall be distinct and visible.

25. GUARANTEED AND OTHER TECHNICAL PARTICULARS FOR TRANSFORMERS:

Guaranteed Technical particulars of the transformers offered shall be furnished in A-4 size paper by the Tenderer in the proforma appended herewith at **Annexure V to VIII**. Complete details shall be furnished. Tolerances on weight quantity and dimension figures shall be $\pm 5\%$ at the tender stage, subject to maintaining the minimum electrical clearances as per the specification. However, no negative tolerance shall be allowed on the short circuit type tested design. Electrical performance data shall be subject to tolerances as per ISS, unless otherwise specified in this specification. However, the Total losses at 50% & 100 % loading shall be maximum guaranteed without any positive tolerance.

26. TYPE TEST CERTIFICATES:

The bidder shall furnish type test certificates of offered design / similar design, wherever available, with the bid. (Not older than 5 Years)

27. DRAWINGS AND OTHER DOCUMENTS:

The tenders shall be accompanied with the following drawings / Calculation sheets, as per the offered designs. The drawings shall be only on A-3 (420 x 297 mm) size paper and calculation sheet shall be on A-4 size paper only.

- a) Name rating / diagram plate drawing.
- b) Outline and general arrangement drawing.
- c) Core-coil assembly drawing.
- d) Core section (for limb and yoke) along with flux density calculation sheet / drawing.
- e) Cooling area calculation sheet.
- f) Thermal Ability short circuit calculation sheet.
- g) Core loss and magnetization curves of the laminations.
- h) Heat dissipation calculations (heat dissipation by tank walls excluding top and bottom should be 500 W/sq.meter.

28. INSPECTION AND TESTING:

The inspection and testing shall be conducted as per relevant clause of the General Conditions of Contract and mentioned elsewhere in tender document. The transformers shall be completely assembled and tested at the factory. The inspection tests as mentioned below are to be carried out by the bidder at any of the Govt of India authorised labs/Testing House or Central Testing Laboratory at Jaipur of JVVNL and reports be attached with the tender document. The costs of these tests are to be borne by the supplier itself.

The details of the tests are mentioned below(Reports to be attached with tender document **mandatory**):

NOTE:- Penal provision shall be made for any short technical parameters found / noticed in the transformers at any time even beyond guarantee period.

30 ROUTINE/ ACCEPTANCE TESTS:

- B) 100% testing of the Distribution Transformers shall be carried out at firm's works for measurement of total load losses at 50% & 100 % loading. Remaining testing shall also continue to be carried out as per practice.

The supplier shall invariably furnish manufacturer's routine test certificate along with detailed tests as mentioned below duly done at any Govt of India authorised(NABL accredited) labs/Testing House like ERDA/CPRI or Central Testing Laboratory at Jaipur of JVVNL.

The transformer shall be subjected to the following routine / acceptance tests in accordance with the relevant ISS:

1. Insulation resistance
2. Separate source voltage withstand test
3. Induced over voltage withstand test
4. Measurement of windings resistance cold (at or near the test bed temperature)
5. Measurement of Voltage ratio and check of voltage vector relationship
6. Measurement of Impedance voltage.
7. Measurement of total losses at rated voltage and normal frequency (at 50% & 100% loading).
8. Measurement of No load current at 100 % and 112.5% of rated voltage and normal frequency.
9. Checking of rating and terminal marking plate.
10. **Pressure Test (As per IS 1180 Part-1:2014)**
11. **Oil leakage Test (As per IS 1180 Part-1:2014)**
11. Checking of weights , dimensions, fittings and accessories, tank sheet thickness, oil quantity , material, finish , paint thickness and workmanship as per purchase order and contract drawings.
12. Oil dielectric strength (break down voltage) test shall be carried out on the transformers opened for physical verification and average value shall be calculated.

Following tests shall also be carried out at manufacturer's works on one complete unit of 500 KVA Transformers unit

- v) Over Flux Density Test (in the first lot and may be repeated in subsequent lots if desired by purchaser).
- vi) Measurement of unbalance current. (See note below)
- vii) Magnetic Balance Test (See note below)
- viii) Oil Leakage Test (See note below)

Note: It will be mandatory for the manufacturer firms to maintain record of BDV value of the transformer oil, Meggar value of the transformer and record of Air Pressure Test and shall furnish it in the tender document.

General Guidelines for various tests:

i) **INSULATION RESISTANCE MEASUREMENT:**

Insulation resistance of selected samples shall be measured with a 2500 V Megger, of standard make such as M/s AVO, M/s Sakova, M/s Wako, M/s Evershed, Vignole or Metrawatt. The minimum insulation resistance, in Mega Ohms, shall be as indicated in the table below:

	20 Deg.C.	30 Deg.C.	40 Deg.C	50 Deg.C.	60 Deg.C.
11000 Volts (HV)	800	400	200	100	50
433 Volts (LV)	400	200	100	50	25

- viii) **PRESSURE TEST (Routine Test):-The transformer with bolted cover shall be tested at an air pressure of 35 KPa above atmosphere pressure maintained inside the tank for 10 min. There should be no leakage at any point.**

iii) **MAGNETIC BALANCE TEST:**

This test shall be conducted as an additional test on one sample transformer from each lot offered for inspection.

The application of low voltage to the middle limb will induce approximately equal voltages on the two end limbs. The application of voltage to the end limbs will induce greater voltage in the middle limb and less voltage in the other end limb. Uniformity of induced voltages shall confirm the healthiness of the transformer windings.

The procedure for the test shall be as under:

- d) Apply 250 Volts between LV terminals-2u-2n and measure voltages between 2v-2n & 2w-2n.
- e) Apply 250 Volts between 2v-2n and measure voltages between 2u-2n & 2w-2n.
- f) Apply 250 Volts between 2w-2n and measure voltages between 2u-2n & 2v-2n.

The measured voltages shall satisfy the conditions detailed as above.

iv) OIL LEAKAGE TEST (As per IS 1180 Part-1/2014):

The oil leakage test shall be conducted on one unit selected from the offered lot .The assembled transformer for non-sealed and sealed Type with all fittings including bushing in position shall be tested at a pressure equivalent to twice the normal head measured at the base of tank for 8 hrs. There should be no leakage at any point.

31. TYPE TESTS:

In addition to above tests the following type tests shall be arranged **on the transformer only as per IS :1180 (Part-1/2014)** in accordance with IS:2026 (Part I to III).

- iv) Short circuit test for dynamic and thermal ability: The short circuit test for dynamic and thermal ability shall be arranged at a Govt. approved/ a Govt. recognized/ NABL accredited laboratory/ILAC i.e. International Laboratory Accredited Laboratory/ ILAC i.e. International Laboratory Accreditation Cooperation (in case of foreign laboratory) on one unit of each rating. The transformer(s) for the test shall be selected/ sealed by our inspecting officer from the first lot which shall be of minimum 02 Nos. or 5 % of ordered qty. whichever is more. The short - circuit test shall be conducted only after successful routine tests including measurement of no-load and load losses. The supply shall be accepted only after arranging successful type test on the selected transformer(s).
- v) Impulse voltage withstand test: The impulse voltage withstand test shall be arranged at any testing house accredited to NABL or a Govt. approved/ a Govt. recognized/ NABL accredited laboratory/ILAC i.e. International Laboratory Accredited Laboratory/ ILAC i.e. International Laboratory Accreditation Cooperation (in case of foreign laboratory) for purpose of impulse test. The test shall be conducted on one unit of each rating to be selected by our inspecting officer from the first lot which shall be of minimum 02 Nos. or 5 % of ordered qty. whichever is more. The test procedure shall conform to the requirement of Clause 13 of IS: 2026 (Part-III). Impulse voltage withstand test shall be of **Min. 75 KVp** The supply shall be accepted only after arranging successful impulse test on the selected transformer(s).
- vi) **TEMPERATURE RISE TEST : [As per IS 2026 (Part 2)]**

Temperature rise test shall be conducted on Maximum measured total loss (No load at rated excitation+Load loss at max. current tap at 75 oC) at 100% loading shall be supplied during temperature rise test at a Govt. approved/ a Govt. recognized/ NABL accredited laboratory/ILAC i.e. International Laboratory Accredited Laboratory/ ILAC i.e. International Laboratory Accreditation Cooperation (in case of foreign laboratory).

The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise. Bids not meeting the above limits of temperature rise will be treated as non responsive.

(iv) PRESSURE TEST:(As per IS 1180 (Part 1):2014) : This test shall be conducted as type test at a Govt. approved/ a Govt. recognized/ NABL accredited laboratory.The pressure gauge and vacuum gauge shall be duly calibrated and sealed by an independent recognised test lab(s).

The test procedure shall be as detailed below :

The tank subjected to air pressure of 80 KPa for 30 minutes and vaccume of 500 mm of mercury for 30 minutes. The Permanent deflection of flat plate, after pressure has been released, shall not exceed the values given below

Length of plate up to	Deflection
750 mm	5.0 mm
751 to 1250 mm	6.5 mm
1251 mm to 1750 mm	8.0 mm
Above 1751 mm	9.0 mm

No extra time shall be allowed for arranging these type tests. The cost of above Type Tests shall be borne by the supplier.

The programmed indicating date and place of type test(s), be intimated enabling purchaser to depute his representative to witness the test if desired. The testing house shall be advised to arrange type test result directly alongwith drawings duly attested by the testing authority for our scrutiny and approval. The type-tested transformer(s) shall also be accepted as the part of the supplies.

The requirement of arranging above type tests shall however not to be insisted on the suppliers who have arranged the above type tests within last 5 years from the date of opening of this tender on similar design. Minor changes in the present specification will not necessitate repetition of type test(s), if design of core-coil assembly is similar in essential details.

32. RANDOM SELECTION AND TESTING (RST):

32.1 The purchaser may conduct the following type tests, at any test house(s) as mentioned above. The supplier shall arrange these tests including loading, unloading and to & fro transportation from our stores to the test house(s). The charges for such tests shall be reimbursable to the supplier on actual basis on production of documentary evidence in case the selected sample successfully withstand type test(s). In case of otherwise, no charges will be reimbursed.

- vi) Short circuit withstand test for Dynamic & Thermal ability. Measurement of No load Loss & Load Loss shall form part of tests conducted before and the after the short circuit test and recorded in the report.
- vii) **Impulse test at Min. 75 KVp.**
- viii) **Temperature rise Test.**
- ix) **Air Pressure Test at 80 KPa for 30 minutes and vacuum of 250 mm of mercury for 30 minutes for transformer upto 200 KVA rating and 80 KPa for 30 minutes and vacuum of 500 mm of mercury for 30 minutes for transformer above 200 KVA rating and upto including 2500 KVA rating as per IS:1180 Part-I:2014.**
- x) Purchaser reserves the right to carry out any site tests he may decide upon at his own expenses. In case equipment/ material are not found as per P.O., all expenses incurred during the testing will be to supplier's account and material shall be replaced by the supplier at site free of cost.

FAILURE IN TYPE TEST(S):

In the event of failure / unsatisfactory results of the transformer(s) in Dynamic & Thermal Ability to withstand Short Circuit Test / impulse type tests/**Temperature rise Test/ Pressure Test**, the supplier shall have to replace the supplies already made and no further transformers shall be accepted. The purchaser however, at his option, may accept the transformers already supplied with the following conditions:

- i) Guarantee period of the supplied transformers issued to the field shall be increased by double the normal Guarantee period.
- ii) Bank Guarantee shall be extended to cover the additional Guarantee period.
- iii) For failure in any of the type tests listed under RST i.e., short circuit test , Impulse withstand test ,**Temperature rise Test & Pressure Test**, no further supplies shall be accepted. The type test charges shall also not be reimbursable in this case and shall be borne by the supplier.
- iv) The transformers lying in the store(s) shall be replaced as per sub para (v) below.
- v) The bidder shall, however, be allowed to check the reasons of failure and if need be, to improve / modify the design. Further supplies, including replacements against supplies already made, shall be accepted only after successful type test(s) are arranged on fresh transformer(s) selected by the authorized representative of the purchaser. All the type tests shall be arranged in case there is change in the design, otherwise, type test shall be repeated only for the test in which failure has occurred. Charges for such test(s) shall be borne by the supplier. However, in the event of failure of transformer in the repeat type test, the purchaser may take following actions:
 - a) Cancel pending orders of the rating in which failure(s) has occurred, &
 - b) Not place any order of Distribution Transformers on the firm for one/ two year(s)

32.2 Measurement of total losses (at 50% & 100% loading):

(i) After pre-dispatch inspection of material at firm's works, the dispatch instructions will be issued for the respective store(s) as per requirement of Nigam. Sample(s) will be drawn from the lot(s) received in store(s) and will be subjected to the following test(s):

- a) One transformer will be selected out of every lot of 10 Nos. or part thereof for measurement of No load Losses at rated voltage; No Load current (at 100% and 112.5% of rated voltage); Impedance voltage,

thickness of tank body sheet and total Losses at 50% and 100% loading at rated current. The testing shall be arranged either at purchaser's own testing lab and / or at independent test lab. The testing charges for such tests shall be borne by the purchaser. The test results will be applicable to the respective lot of 10 Nos. from which sample was drawn.

- b) In case if dispatch instructions are less than 10 Nos. than one sample shall be selected from each store (s) and the test result so obtained shall be for the quantity consigned / received by the store (s).

The percentage impedance voltage at rated current shall not exceed the permissible limit as specified with allowable tolerance failing which the sub lot of transformers represented by the sample shall be rejected. The transformers selected for total Losses shall also be subjected to magnetizing current and in case found beyond the limit, the lot shall stand rejected.

The I.R. values of the sample(s) shall be measured at any authorised lab/test house(NABL accredited) of Govt of India like ERDA, CPRI etc or CTL, Jaipur and it must be more than 50 MEGA-OHM.(Report to be attached with tender document)

Metal Parts may be checked in any authorised lab/test house(NABL accredited) of Govt of India like ERDA, CPRI etc or CTL, Jaipur as per specification/IS on the transformer which is physically opened.

The No Load Voltage Ratio (Transformer Turn Ratio) may be checked at any authorised lab/test house(NABL accredited) of Govt of India like ERDA, CPRI etc or in CTL with the tolerance as per specification/ IS 2026 on the transformer .

Further, Internal clearances may be checked without opening of core coil assembly in each of the. No negative tolerance shall be admissible. If clearances are not found as per specification then the transformer may be rejected.

The sample of Oil may be taken at CTL from the Transformer opened for physical verification and same may be tested.

If the window height and limb centre are found more than 7.5 mm, the transformer may be rejected. However, a tolerance of ± 2 mm shall be allowed in window height and limb centre.

If the contractor / supplier fails to lift the material declared rejected or any part thereof from the consignee within a period of 15 days from the date of dispatch of information from the purchaser, the purchaser shall be entitled to effect recovery along with other actions.

33 GUARANTEE PERIOD:

The guarantee period of the transformer should be 60 (sixty) months. Firms shall all possible efforts to make the repair in the institute itself. However, in case the repair is not feasible at the institute, Firms shall have to lift failed Transformer from the stores within 60 days of its intimation positively and deliver the same after repair in next 60 days. In case firm fails to deliver transformer after due repair within 120 days or the time prescribed in the relevant order(permission) for repair, a penalty at the rate of ½% per week subject to maximum 10%, shall be levied for the late delivery of repaired Transformer(s). The repaired transformer may be subject to various tests as the need may be before accepting the same.

II) All the transformers repaired/ rectified by the manufacturer under guarantee clause shall carry a further guarantee of 12 months after repair or unexpired guarantee of 60 months from the date of supply, whichever is later, after repair/ rectification

ICAR-CENTRAL SHEEP & WOOL RESEARCH INSTITUTE

Avikanagar Tehsil Malpura Distt. Tonk (Rajasthan) 304501

Section-VI

QUESTIONNAIRE

BIDDERS SHOULD FURNISH SPECIFIC ANSWERS TO ALL THE QUESTIONS GIVEN BELOW. IN CASE A QUESTION DOES NOT APPLY TO A BIDDER, THE SAME SHOULD BE ANSWERED WITH THE REMARK "NOT APPLICABLE". BIDDERS MAY PLEASE NOTE THAT IF THE ANSWERS SO FURNISHED ARE NOT CLEAR AND/OR ARE EVASIVE THE BID WILL BE LIABLE TO BE IGNORED.

1. Bid No..... Date for bid opening on.....
2. Offer is open for acceptance
3. Brand of goods offered :
4. Name & address of manufacturer :
5. Station of Manufacturer. :
6. What is your permanent Income: :
Tax A/C No.
7. Confirm whether you have attached your latest/current ITCC or certified photocopy thereof.
8. Status :
 - (a) Are you currently registered with the Directorate General of Supplies & Disposals (DGS&D) for the item(s) quoted? If so, indicate the date up to which you are registered and whether there is any monetary limit on your registration.
 - (b) Are you a small scale unit currently registered with the National Small Industries Corporation (NSIC) under Single Point Registration Scheme for the items(s) quoted ? If so, indicate the date up to which you are registered and whether there is any monetary limit on your registration.
 - (c) If you are not registered either with NSIC or DGS&D, please state whether you are currently registered with Directorate of Industries of the State Government concerned. If so, indicate the date up to which you are registered and whether there is any monetary limit on your registration.
 - (d) Are you registered under the Indian Companies Act, 1956 or any other Act? Please attach certified copy (copies) of the relevant registration certificate(s) in confirmation to you above answer(s).
9. Please indicate
Name & Full address of your Banker(s):
10. Whether you are :
 - i) Manufacturer of the goods quoted; or
 - ii) Manufacturer's authorized agent for those goods.
13. State whether business dealings with you have been currently banned by any Ministry/Deptt. Of Central Govt. or any State Govt.

Signature of Witness

Name & address of Witness the person signing above For and on behalf of Messrs.

Signature of Bidder

Full name, designation & address of

.....
Name & address of bidding firm)

SECTION VII/1
BID FORM AND BOQS

To

Date.....

The Director
ICAR-Central Sheep & Wool Research Institute
Avikanagar Tehsil Malpura Distt. Tonk (Rajasthan) 304501

Ref:- Your bidding documents No..... dated.....

Having examined the above mentioned bidding documents, including agenda Nos.....(if any), the receipt of which is hereby duly acknowledged, we the undersigned, offer to supply and deliver equipments/items mentioned in Part-1 of Schedule of requirements in conformity with the said bidding documents for the sum as shown in the BOQs, attached herewith and made part of this bid.

We undertake if our bid is accepted, to deliver the goods and complete the services in accordance with the delivery schedule specified in the **Schedule of requirements** after fulfilling all the applicable requirements incorporated in the above referred bidding documents.

If our bid is accepted, we will provide you with performance security as per the instructions specified in GCC clause 7 and in a form accept bid to you in terms of GCC clause 7.5 for a sum equivalent to 10% (ten percent) of the contract price for the due performance of the contract.

We agree to abide by this bid for the bid validity period specified in th ITB clause 15(read with modification, if any, in the Bid Data Sheet) or for the subsequently extended period, if any, agreed to by us and it shall remain binding up on us and may be accepted at any time before the expiration of that period.

Until a format contract is prepared and executed this bid together with your written acceptance thereof and your notification of award, shall constitute a binding contract between us.

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

Dated this..... day of.....2017.....

Signature
(in the capacity of)
Duly authorized to sign bid for and on behalf of)

Section VII/2

BANK GUARANTEE FORM FOR BID SECURITY

Whereas..... (name of bidder) (hereinafter called “the bidder”) has submitted his bid dated(date) for the supply of(brief description of the relevant goods and services) (hereinafter called “the bid”). Against the purchaser’s tender enquiry No.....

KNOW ALL PEOPLE by these presents that We(name of the bank) having registered office at(full address) (hereinafter called “the bank”) are bound into(name of the purchaser) (hereinafter called the purchaser”) in the sum of(amount in figures and in words) 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 of20.....

THE CONDITIONS OF THIS OBLIGATION ARE:

1. If the bidder/ tenderer Withdraws or amends, impairs or derogates from the tender in any respect within the period of validity of this tender.
2. If the bidder/tenderer having been notified of the acceptance of its tender by the Purchaser during the period of bid validity:-
 - a) If the tenderer fails to furnish the Performance Security for the due performance of the contract.
 - b) Fails or refuses to accept/execute the contract.

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 in its demand the purchaser will note that the amount claimed by it is due to it, owing to the occurrence of one or both of the above mentioned two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including 45 (forty five) days after the period of tender validity and any demand in respect thereof should reach the bank not later than the above date.

.....

Signature of the Bank Seal of the Bank

.....

Name and designation of the officer

.....

Seal, name & address of the Bank and address of the Branch

Date :& Place

SECTION VII/3

MANUFACTURER'S AUTHORISATION FORM

To

The Director
ICAR-Central Sheep & Wool Research Institute
Avikanagar Tehsil Malpura Distt. Tonk (Rajasthan) 304501

Ref: your Bidding Documents No.....dated.....

Dear Sir,

We....., who are established and reputable manufacturers of
..... (name and description of the goods offered in the bid) having factories at
..... hereby authorize Messrs.....(name and address of the
agent) to submit a bid, negotiate (as and if necessary) and conclude the contract with you against your above
mentioned Bidding Documents for the above goods manufactured by us.

No company or firm or individual other than Messrs.....(name and address of the above
agent) is authorized to bid, negotiate and conclude the contract against this specific Bidding Documents for the
above mentioned goods manufactured by us.

We hereby extend our full guarantee and warranty as per clause 15 of the General Conditions of Contract,
read with modification, if any in the Special Conditions of contract for the goods and services offered for supply
against this Bidding Document by the above firm.

Yours faithfully,

(Signature name and designation)

for and behalf of Messrs.....

[name & address of the manufacturers]

Note: This letter of authorization should be on the letter head of the manufacturing firm and should be signed by a person competent and having the power of attorney to legally bind the manufacturer. The authorization Certificate should be from the "Manufacturer" only and certificate from any other firm/person including OEM arrangements would not be accepted.

SECTION VII/4
BANK GUARANTEE FORM FOR PERFORMANCE SECURITY

To

The Director
ICAR-Central Sheep & Wool Research Institute
Avikanagar Tehsil Malpura Distt. Tonk (Rajasthan) 304501

Whereas.....(name and address of the supplier) herein after called “the supplier”) has taken, in pursuance of contract NO..... dated.....to supply.....(description of goods and services) (hereinafter called “the contract)

And whereas it has been stipulated by you in the said contract that the supplier shall furnish you with a bank guarantee by a recognized bank acceptable to you, for the sum specified therein as security for compliance with its (supplier’s) obligations in accordance with the contract.

AND WHEREAS we have agreed to give the supplier such a bank guarantee:

NOW THEREFORE we hereby affirm that we are guarantors and responsible to you, on behalf of the supplier, up to a total of (amount of the guarantee in words and figures), such sum being payable in the types and proportions of currencies in which the contract price is payable, and we undertake to pay you, upon your first written demand declaring the supplier to be in default under the contract and without cavil or argument, any sum or sums within the limits of (amount of guarantee) as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

We further undertake to pay you the sum so demanded notwithstanding any dispute or disputes raised by the supplier in any suit or proceedings pending before any court or tribunal relating liability under this present being absolute and univocal.

We also hereby waive the necessity of your demanding the said amount from the supplier before presenting us with the demand.

We further agree that you shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the contract or to extend the time of performance by the supplier from time to time or to postpone for any time or from time to time any of the powers exercisable by you against the supplier and to forbear or enforce any of the terms and conditions relating to the contract and we shall not be relieved from our liability under this guarantee.

This guarantee shall be valid and shall remain in force until.....day of20.....

Dated the.....day of.....20 For
.....
(name of the Bank)

Signature..... Name
of the officer..... (in
Block letters)
Designation of the officer.....
Code No.....
Name of the Bank and full address

SECTION VII/5
CONTRACT FORM

Address of the purchaser's
Office issuing the contract

Contract No.

Date

This is in continuation to this office' Notification of Award No. dated

1. Name & address of the Supplier.
2. Purchaser's bidding documents No..... dated..... (followed by further communication No. and date, if any, from the purchaser to the supplier)
3. Supplier's bid No dated (followed by further communication No. and date, if any, from the supplier to the purchaser).
4. The documents, which are deemed to form and be read and construed as part of this contract are:
 - (a) the Bid form and the BOQ (BOQ) submitted by the bidder;
 - (b) the Schedule of Requirements;
 - (c) the Technical Specification and Quality Control Requirements.
 - (d) the General Conditions of Contract; and
 - (e) the purchaser's Notification of Award

Certain stipulations out of the above documents are reproduced below for ready reference.

However, the words and expressions used in this contract agreement shall have the same meaning as are respectively assigned to them in the Conditions of Contract referred to:-

5. Details of Performance Security.,
6. Brief particulars of the goods and services, which shall be supplied/provided by the supplier is as under:

Schedule no.	Brief description of goods/services	Accounting unit	Quality to be supplied	Unit Price	Total Price	Delivery Terms (FOB/ CIF/Free Delivery at site /CIP etc.)

Total value (in figure) (in words)

7. Delivery schedule
8. Details of inspection, test and quality assurance
 - (a) Designation and address of inspection agency
 - (b) Mode(s) and place (s) of conducting inspections and tests.
9. Transit Insurance
10. Dispatch Instructions
11. Details of consignee (including port consignee, if any)
12. Payment terms
13. Paying Authority
14. Warranty clause

.....
(Signature, name and address
of the purchaser's authorized functionary
signing the contract

For and on behalf of

Received and accepted this
contract Agreement

.....
(Signature, name and address of the supplier's authorized executive)

For and on behalf of
(Name and address of the supplier)

.....
(Seal of the supplier
Date and Place :

TENDER ACCEPTANCE LETTER
(to be given on company letter head)

To

Sub: Acceptance of Terms & Conditions of Tender.

Tender Reference No: _____

Name of Tender / Work: -

Dear Sir,

1. I/ We have downloaded / obtained the tender document(s) for the above mentioned 'Tender/Work' from the web site(s) namely:

_____ as per your advertisement, given in the above mentioned website(s).

2. I / We hereby certify that I / we have read the entire terms and conditions of the tender documents from Page No. _____ to _____ (including all documents like annexure(s), schedule(s), etc.), which form part of the contract agreement and I / we shall abide hereby by the terms / conditions / clauses contained therein.

3. The corrigendum(s) issued from time to time by your department/organisation too have also been taken into consideration, while submitting this acceptance letter.

4. I / We hereby unconditionally accept the tender conditions of above mentioned tender document(s) / corrigendum(s) in its totality / entirety.

5. I / We do hereby declare that our Firm has not been blacklisted/ debarred by any Govt. Department/Public sector undertaking.

6. I / We certify that all information furnished by the our Firm is true & correct and in the event that the information is found to be incorrect/untrue or found violated, then your department/organisation shall without giving any notice or reason therefore or summarily reject the bid or terminate the contract, without prejudice to any other rights or remedy including the forfeiture of the full said earnest money deposit absolutely.

Yours Faithfully,

(Signature of the Bidder, with Official Seal)

CERTIFICATE OF PRICE JUSTIFICATION
[To be given on letter head]

NIT No.:

I/We, M/s. _____ certify that the discount provided are our best and we have not given these materials to any Government Department/ PSU/Institution for lesser than these rates in last one year.

SIGNATURE AND STAMP OF THE BIDDER

CERTIFICATE OF NO DEVIATION

[To be given on letter head]

NIT No.:

I/We, M/s _____ hereby certify that notwithstanding any contrary indication / conditions elsewhere in our offer documents, I/We have neither set any terms and conditions nor there is any deviation taken from the conditions of CSWRI, Avikanagar tender specification, either technical or commercial, and I/We agree to all the terms and conditions mentioned in CSWRI, Avikanagar tender specification with associated amendments & clarification.

[Signatures of the Bidder with Name, Designation & Company's Seal]

NON BLACKLISTING CERTIFICATE

[To be submitted on letterhead]

I/We hereby certify that the [Name of the company / firm] has not been ever blacklisted/ debarred by any Central / State Government / Public Undertaking / Institute on any account.

I/We also certify that firm will supply the item as per the specification given by CSWRI, Avikanagar and also abide all the terms and conditions stipulated in Rate Contract.

I/We also certify that the information given in bid is true and correct in all aspects and in any case at a later date it is found that any details provided are false and incorrect, contract given to the concern firm or participation may be summarily terminated at any stage, the firm will be blacklisted and CSWRI, Avikanagar may imposed any action as per NIT rules.

Date :

Place :

Name :

Business Address :

Signature of Bidder :

Seal of the Bidder :

GUARANTEED AND OTHER PARTICULARS FOR DISTRIBUTION
TRANSFORMERS
(To be furnished by the Manufacturer)

Sl.No.	Description	Compliance in yes or No	Relevant IS std.
1.	Make		
2.	Name of Manufacturer		
3.	Place of Manufacture		
4.	Voltage Ratio		
5.	Rating in KVA	315 KVA	
6.	Core Material used and Grade: a) Flux density b) Over fluxing without saturation (Curve to be furnished by the Manufacturer in support of his claim)		
7.	Maximum temperature rise of : a) windings by resistance method b) Oil by thermometer		
8.	Magnetising (no-load) current at: a) 90% Voltage b) 100% Voltage c) 110% Voltage		
9.	Core loss in watts : a) Normal voltage b) Maximum voltage		
10.	Resistance of windings at 20 ⁰ C (with 5% tolerance) : a. HV Winding (ohms) b. LV Winding (ohms)		
11.	Full load losses (watts) at 75 ⁰ C		
12.	Total Losses at 100% load at 75 ⁰ C		
13.	Total Losses at 50% load at 75 ⁰ C		
14.	Current density used for : (Amper/sq mm) a) HV Winding b) LV Winding		
15.	Clearances : (mm) a) Core and LV b) LV and HV c) HV Phase to Phase d) End insulation clearance to earth e) Any point of winding to tank		
16.	Efficiency at 7 ⁰ C : a) Unity P.F. and b) 0.8 P.F. 1) 125% load 2) 100% load 3) 75% load 4) 50% load 5) 25% load		
17.	Regulation at : a) Unity P.F. b) 0.8 P.F. at 75 ⁰ C		
18.	% Impedance at 75 ⁰ C		
19.	Flash Test : (i) HV 28 kV / 50 HZ for 1 minute (ii) LV 3 kV/50 Hz for 1 minute		
20.	Over potential Test (Double Voltage and Double frequency for 1 minute)		
21.	Impulse test		
22.	Mass of : (kg) a) Core lamination (minimum) b) Windings (minimum) c) Tank and fittings d) Oil e) Oil quantity (minimum) (litre) f) Total weight		
23.	Oil Data : 1. Quantity for first filling (minimum) (litre)		

	2. Grade of oil used 3. Maker's name 4. BDV at the time of filling (kV)		
24.	Transformer: 1) Overall length x breadth x height (mm x mm x mm) 2) Tank length x breadth x height 3) Thickness of plates for a) Side plate (min) b) Top and bottom plate (min) 4) Conservator Dimensions		
25.	Radiation: 1) Heat dissipation by tank walls excluding top and bottom 2) Heat dissipation by cooling tube 3) Diameter and thickness of cooling tube 4) Whether calculation sheet for selecting cooling area to ensure that the transformer is capable of giving continuous rated output without exceeding temperature rise is enclosed.		
26.	Inter layer insulation provided in design for : 1) Top and bottom layer 2) In between all layer 3) Details of end insulation 4) Whether wedges are provided at 50% turns of the HV coil		
27.	Insulation materials provided a) For Conductors (1) HV (2) LV b) For Core		
28.	25. Material and Size of the wire used 1) HV Dia (mm) (SWG) <input type="text"/> <input type="text"/> 2) LV a) Strip size b) No. of Conductors in parallel c) Total area of cross section (sq mm)		
29.	Whether the name plate gives all particulars as required in Tender		
30.	Particulars of bushings HV/LV 1) Maker's name 2) Type IS-3347/IS-2099/IS7421 3) Rating as per IS 4) Dry power frequency voltage withstand test 5) Wet power frequency voltage withstand test		

Note: The following shall be specifically confirmed:

- 1) Whether the offer conforms to the limits of impedance mentioned in the specification
- 2) Whether the offer conforms to the limits of temperature rise mentioned in the specification.
- 3) Whether the losses of the transformers offered are within the limits specified.
- 4) Whether the transformer offered is already type tested for the design and test reports enclosed.

PROFORMA FOR PRE-DELIVERY INSPECTION OF
DISTRIBUTION TRANSFORMERS

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

(A) ACCEPTANCE TESTS TO BE CARRIED OUT

Sl. No.	PARTICULARS	OBSERVATIONS
1	(a) Ratio Test	AB/an
		BC/bn
		CA/Cn
	(b) Polarity Test	
2	No load loss measurement	
		W1
		W2
		W3
	TOTAL	
	Multiplying Factor	
	CT	
	Watt meter	
	Total x MF	
	NET LOSS	
3	Load loss measurement	
		W1
		W2
		W3
	TOTAL	
	Multiplying Factor	
	CT	
	Watt meter	
	PT	
	Total x MF	
	Loss at ambient temperature (watt)	
	Loss at 75 ^o C (with calculation sheet) (watt)	
4	Winding Resistance	
	H.V. (In Ohms)	
	(a) At ambient temperature of _____ ^o C.	A-B
		B-C
		C-A
	(b) Resistance at 75 ^o C.	A-B
		B-C
		C-A
	L.V. (In Ohm)	
	(a) At ambient temperature of _____ ^o C.	a-b
		b-c
		c-a
	(b) Per Phase resistance at 75 ^o C.	a-b
		b-c
		c-a
5	Insulation Resistance (M ohm)	HV-LV
		HV-E
		LV-E
6	Separate Source Voltage withstand test voltage	
		HV 28 kV for 60 secs.
		LV 3 kV for 60 secs.
7	Induced over-voltage withstand test at double voltage and double frequency	100 Hz, 866 volts for 60 seconds.
8	No load current at	

	90% volts	
	110% volts	
9	Unbalance current	
10	Vector group test	Diagram and readings be shown in separate sheets
11	Percentage Impedance at 750 C (Please furnish calculation sheet)	
12	Transformer oil test (Break down voltage)	
13	Oil leakage test	
14	Heat run test	To be carried out once against the order
15	Bushing clearance (mm)	HV
	(a) Phase to Phase	
	(b) Phase to Earth	
16	Comments on compliance by the firm on the modifications done as per stage inspection clearance letter issued	
17	Whether fittings of the order have been verified.	
18	Whether aluminium die cast silicagel breather with tin container is fitted on the transformers offered.	
19	Whether engraving of Sl.No. and Name of firm on core clamping channel, side wall and top cover of tank has been verified.	
20	Whether MS Plate of size 125 x 125 mm welded on with side of stiffner.	
21	Whether engraving of name of firm, Sl. No. and Rating of transformer, Order No. and date and Date of Despatch on MS Plate.	
22	Copy of calibration certificates of metering equipments be enclosed.	

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

Sl. No.	PARTICULARS	OBSERVATIONS
1	Details of the transformer dismantled for physical verification	
	(a) Rating (kVA)	
	(b) Sl. No.	
2	Whether GI Nut Bolts with one spring one plain washer provided for tightening the tank cover.	
3	Details of gasket used between top cover and tank Material	
	(i) Thickness (mm)	
	(ii) Type of joints	
4	Whether core is earthed properly with copper strip (one end should be tightened in between the core laminations and other end bolted on core clamping channel)	
5	Connections from winding to bushings (describe the manner in which it has been done)	
	(a) HV	
	(b) LV	
	(c) Formation of Star connection on LV side	
6	Winding wire dia and cross sectional area	
	(a) HV	
	(i) Dia (mm)	
	(ii) Area (sq mm)	
	(b) LV	
	(i) L x W x Nos. of layer	
	(ii) Area (sq mm)	
7	Thickness of press board (s) provided between HV coils to cover the tie rods	
8	Whether painted with oil and corrosion resistant paint / varnish	
	(a) Inside of the tank	
	(b) Inside of the conservator tank	
	(c) Core clamping and core base channels	
	(d) Tie rods	
	(e) Core bolts	
9	Whether tie rods and core bolts insulated, if yes, material of insulation.	
10	Whether flap on inner side of top cover provided to prevent direct falling of oil on core- coil assembly	
11	Method of joints	

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

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

SIGNATURE OF FIRM'S
REPRESENTATIVE
(with name and designation)

GUARANTEED AND OTHER PARTICULARS FOR DISTRIBUTION
TRANSFORMERS
(To be furnished by the Manufacturer)

Sl.No.	Description	Compliance in yes or No	Relevant IS std.
31.	Make		
32.	Name of Manufacturer		
33.	Place of Manufacture		
34.	Voltage Ratio		
35.	Rating in KVA	500 KVA	
36.	Core Material used and Grade: a) Flux density b) Over fluxing without saturation (Curve to be furnished by the Manufacturer in support of his claim)		
37.	Maximum temperature rise of : a) windings by resistance method b) Oil by thermometer		
38.	Magnetising (no-load) current at: a) 90% Voltage b) 100% Voltage c) 110% Voltage		
39.	Core loss in watts : a) Normal voltage b) Maximum voltage		
40.	Resistance of windings at 20 ⁰ C (with 5% tolerance) : a. HV Winding (ohms) b. LV Winding (ohms)		
41.	Full load losses (watts) at 75 ⁰ C		
42.	Total Losses at 100% load at 75 ⁰ C		
43.	Total Losses at 50% load at 75 ⁰ C		
44.	Current density used for : (Amper/sq mm) a) HV Winding b) LV Winding		
45.	Clearances : (mm) a) Core and LV b) LV and HV c) HV Phase to Phase d) End insulation clearance to earth e) Any point of winding to tank		
46.	Efficiency at 7 ⁰ C : a) Unity P.F. and b) 0.8 P.F. 1) 125% load 2) 100% load 3) 75% load 4) 50% load 5) 25% load		
47.	Regulation at : a) Unity P.F. b) 0.8 P.F. at 75 ⁰ C		
48.	% Impedance at 75 ⁰ C		
49.	Flash Test : (i) HV 28 kV / 50 HZ for 1 minute (ii) LV 3 kV/50 Hz for 1 minute		
50.	Over potential Test (Double Voltage and Double frequency for 1 minute)		
51.	Impulse test		
52.	Mass of : (kg) a) Core lamination (minimum) b) Windings (minimum) c) Tank and fittings d) Oil e) Oil quantity (minimum) (litre) f) Total weight		
53.	Oil Data : 1. Quantity for first filling (minimum) (litre)		

	2. Grade of oil used 3. Maker's name 4. BDV at the time of filling (kV)		
54.	Transformer: 1) Overall length x breadth x height (mm x mm x mm) 2) Tank length x breadth x height 3) Thickness of plates for a) Side plate (min) b) Top and bottom plate (min) 4) Conservator Dimensions		
55.	Radiation: 1) Heat dissipation by tank walls excluding top and bottom 2) Heat dissipation by cooling tube 3) Diameter and thickness of cooling tube 4) Whether calculation sheet for selecting cooling area to ensure that the transformer is capable of giving continuous rated output without exceeding temperature rise is enclosed.		
56.	Inter layer insulation provided in design for : 1) Top and bottom layer 2) In between all layer 3) Details of end insulation 4) Whether wedges are provided at 50% turns of the HV coil		
57.	Insulation materials provided a) For Conductors (1) HV (2) LV b) For Core		
58.	25. Material and Size of the wire used 1) HV Dia (mm) (SWG) <input type="text"/> <input type="text"/> 2) LV a) Strip size b) No. of Conductors in parallel c) Total area of cross section (sq mm)		
59.	Whether the name plate gives all particulars as required in Tender		
60.	Particulars of bushings HV/LV 1) Maker's name 2) Type IS-3347/IS-2099/IS7421 3) Rating as per IS 4) Dry power frequency voltage withstand test 5) Wet power frequency voltage withstand test		

Note: The following shall be specifically confirmed:

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- 2) Whether the offer conforms to the limits of temperature rise mentioned in the specification.
- 3) Whether the losses of the transformers offered are within the limits specified.
- 4) Whether the transformer offered is already type tested for the design and test reports enclosed.

PROFORMA FOR PRE-DELIVERY INSPECTION OF
DISTRIBUTION TRANSFORMERS

6.	Name of the firm		
7.	Details of offer made		
	(i) Order No. and Date		
	(ii) Rating		
	(iii) Quantity		
	(iv) Sl. No. of transformers		
8.	Date of stage inspection of the lot		
9.	Reference of stage inspection clearance		
10.	Quantity offered and inspected against the order prior to this lot		

(A) ACCEPTANCE TESTS TO BE CARRIED OUT

Sl. No.	PARTICULARS	OBSERVATIONS
1	(a) Ratio Test	AB/an
		BC/bn
		CA/Cn
	(b) Polarity Test	
2	No load loss measurement	
		W1
		W2
		W3
	TOTAL	
	Multiplying Factor	
	CT	
	Watt meter	
	Total x MF	
	NET LOSS	
3	Load loss measurement	
		W1
		W2
		W3
	TOTAL	
	Multiplying Factor	
	CT	
	Watt meter	
	PT	
	Total x MF	
	Loss at ambient temperature (watt)	
	Loss at 75 ⁰ C (with calculation sheet) (watt)	
4	Winding Resistance	
	H.V. (In Ohms)	
	(a) At ambient temperature of _____ ⁰ C.	A-B
		B-C
		C-A
	(b) Resistance at 75 ⁰ C.	A-B
		B-C
		C-A
	L.V. (In Ohm)	
	(a) At ambient temperature of _____ ⁰ C.	a-b
		b-c
		c-a
	(b) Per Phase resistance at 75 ⁰ C.	a-b
		b-c
		c-a
5	Insulation Resistance (M ohm)	HV-LV
		HV-E
		LV-E
6	Separate Source Voltage withstand test voltage	
		HV 28 kV for 60 secs.
		LV 3 kV for 60 secs.
7	Induced over-voltage withstand test at double voltage and double frequency	100 Hz, 866 volts for 60 seconds.
8	No load current at	

	90% volts	
	110% volts	
9	Unbalance current	
10	Vector group test	Diagram and readings be shown in separate sheets
11	Percentage Impedance at 750 C (Please furnish calculation sheet)	
12	Transformer oil test (Break down voltage)	
13	Oil leakage test	
14	Heat run test	To be carried out once against the order
15	Bushing clearance (mm)	HV
	(a) Phase to Phase	
	(b) Phase to Earth	
16	Comments on compliance by the firm on the modifications done as per stage inspection clearance letter issued	
17	Whether fittings of the order have been verified.	
18	Whether aluminium die cast silicagel breather with tin container is fitted on the transformers offered.	
19	Whether engraving of Sl.No. and Name of firm on core clamping channel, side wall and top cover of tank has been verified.	
20	Whether MS Plate of size 125 x 125 mm welded on with side of stiffner.	
21	Whether engraving of name of firm, Sl. No. and Rating of transformer, Order No. and date and Date of Despatch on MS Plate.	
22	Copy of calibration certificates of metering equipments be enclosed.	

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

Sl. No.	PARTICULARS	OBSERVATIONS
1	Details of the transformer dismantled for physical verification	
	(a) Rating (kVA)	
	(b) Sl. No.	
2	Whether GI Nut Bolts with one spring one plain washer provided for tightening the tank cover.	
3	Details of gasket used between top cover and tank Material	
	(i) Thickness (mm)	
	(ii) Type of joints	
4	Whether core is earthed properly with copper strip (one end should be tightened in between the core laminations and other end bolted on core clamping channel)	
5	Connections from winding to bushings (describe the manner in which it has been done)	
	(a) HV	
	(b) LV	
	(c) Formation of Star connection on LV side	
6	Winding wire dia and cross sectional area	
	(a) HV	
	(i) Dia (mm)	
	(ii) Area (sq mm)	
	(b) LV	
	(i) L x W x Nos. of layer	
	(ii) Area (sq mm)	
7	Thickness of press board (s) provided between HV coils to cover the tie rods	
8	Whether painted with oil and corrosion resistant paint / varnish	
	(a) Inside of the tank	
	(b) Inside of the conservator tank	
	(c) Core clamping and core base channels	
	(d) Tie rods	
	(e) Core bolts	
9	Whether tie rods and core bolts insulated, if yes, material of insulation.	
10	Whether flap on inner side of top cover provided to prevent direct falling of oil on core- coil assembly	
11	Method of joints	

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

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

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