

**North Eastern Electricity Supply Company of Orissa Limited (NESCO)
Western Electricity Supply Company of Orissa Limited (WESCO)
Southern Electricity Supply Company of Orissa Limited (SOUTHCO)
Registered Office,
123, Sector-A, Zone-A, Mancheswar Industrial Estate, Bhubaneswar, Orissa-751010
Tel No. (0674) 2582728, Fax No. (0674) 2586343**

VOLUME- I

(Tender Notification : CSO/03/Distribution Transformer)

2007 - 2008

Date: 29.02.2008

Section – I

INVITATION FOR BIDS (IFB)

2007-08

(Tender Notification: CSO/03/Distribution Transformer)

Date: 29.02.2008

Registered Office of NESCO, WESCO & SOUTHCO

- 1.0 The Registered Office of NESCO, WESCO & SOUTHCO (here in after referred as CSO) invites Sealed tenders in Two part Bids ("Technical Bids" & "Commercial Bids") for supply of Distribution Transformers from reputed manufacturers having requisite experience and financial capabilities as specified in clause 6.0 below. The sealed envelopes shall be duly superscribed as "TENDER NOTICE/CSO/03/ Distribution Transformer due for opening on dt. 29.03.08".

| Sl. No. | Capacity of Transformer | Qty | | | |
|---------|-------------------------|-------|-------|---------|-------|
| | | WESCO | NESCO | SOUTHCO | TOTAL |
| 1 | 100 KVA | 160 | 200 | 175 | 535 |
| 2 | 315 KVA | 50 | 0 | 13 | 63 |
| 3 | 500 KVA | 25 | 0 | 2 | 27 |

- 2.0 The schedule of specifications with detail terms & conditions can be obtained from address given below against demand draft of Rs. 5000/- plus 4% VAT drawn in favour of NESCO Ltd., payable at Bhubaneswar. The tender papers will be issued in all working days upto of each day & will continue upto 25.03.2008.

The tender documents can also be downloaded from the website of the three companies as stated below :-

wescoorissa.com, nescoorissa.com & southcoorissa.com

In case tender papers are downloaded from any of the above websites, then the bidder has to enclose a demand draft covering the cost of bid documents as stated above in a separate envelope with suitable superscription "Cost of Bid Documents : Tender Notice Ref : CSO/03/Distribution Transformer". This envelope should accompany the Bid Documents and to be enclosed in the envelope containing the "Technical Bid" & "Bid Security".

In case the prospective bidders wants that the tender documents are to be forwarded to him by post, the same can be availed by sending a request letter along with Demand Draft covering the cost of the bidding document + Rs.50.00. This office shall not take any responsibility for delay in receipt of such request letter by the purchaser or delay in receipt of tender documents by bidder in transit on account of any reasons what so ever.

- 3.0 Offers will be received upto 1.00 PM. on dt. 29.03.08 & the "Technical Bid" will be opened on the same day at 3.00 PM. in presence of the authorized representatives of the bidders. After evaluation of Technical Bids, the eligible bidders shall be intimated to attend the Opening of Commercial Bids not later than 15 days from the date of opening of the Technical Bid as stated earlier.
- 4.0 The schedule of specifications with detail terms & conditions are enclosed. It is the sole responsibility of the bidder to ensure that the bid documents reach this office on or before the cut off due date of tender opening.

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

- (i). Bid security @ 2% (Two percent) of the Tender value is not deposited in shape of Bank Draft in favor of NESCO, payable at Bhubaneswar or Bank Guarantee. Bid security if any submitted against previous Tenders, will not be adjusted towards Bid security against this Tender.
- (ii). The offer does not contain "FOR, Balasore/ Burla / Berhampur price indicating break-up towards all taxes & duties".
- (iii). Complete Technical details are not enclosed.
- (iv). Tender is received after due time due to any reason.

6.0 Qualification Criteria :-

The prospective bidder must qualify all of the following requirements to be eligible to participate in the bidding.

- a) Bidder must have successfully carried out Type Test of Transformers from any NABL Accredited Laboratory. The said Type Test report should not be prior to 5 yrs. from the date of opening of Technical Bid. Type test is mandatory for each capacity of transformer to be quoted.
- b) Bidder must quote at least 50% of the tender qty. against any one capacity or more than one capacity of Transformer.
- c) Bidder should have supplied at least 100% of the offered quantity to Electricity Distribution Utility / PSU in any one year out of the past 3 financial years. The bidder should enclose Performance Certificate of the user as proof of successful operation in field for minimum 1 years.

7.0 Project Completion Schedules :-

| Description | Date |
|---|-----------------------------|
| Issue of Tender Document | 01.03.2008 |
| Receipt of Queries from Bidders (if any) | 15.03.2008 |
| Replies to the Queries | 18.03.2008 |
| Submission of Bids | 29.03.2008 by 1.00 PM |
| Opening of Technical Bids | 29.03.2008 at 3.00 PM |
| Receipt of Clarification from Bidders (if any) | 04.04.2008 |
| Intimation to Bidders for Opening of Commercial Bid | 08.04.2008 |
| Opening of Commercial Bid (To be confirmed later) | 12.04.2008 (Tentative Date) |
| Issue of LOI / Purchase Order | 23.04.2008 |

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| | |
|-------------------|--|
| Supply completion | Phased manner & to be completed by 4 months from the date of LOI |
|-------------------|--|

8.0 All correspondences with regard to the above shall be made to the following address:

Addl. Manager (Tech) / Dy. Manager (MAC)

Central Services Office

(NESCO, WESCO & SOUTHCO)

Plot No. 123, Sector – A, Zone – A

Mancheswar Industrial Estate

Bhubaneswar – 751 010

FAX : (0674) 2586343

Email : biswakeshdash@rediffmail.com / susantasarangi@sify.com

Mobile : 93382 14150 / 93376 46022

SECTION – II

**INSTRUCTION TO BIDDERS (ITB)
2007-2008**

(Tender Notification : CSO/03/Distribution Transformer)

Date: 29.02.2008

Registered Office of NESCO, WESCO & SOUTHCO

A. GENERAL

1.0 NESCO / WESCO / SOUTHCO, hereinafter referred to as the "Purchaser" is desirous of implementing the various Systems Improvement works at their respective licensed area in the state of Orissa. Under the S.I. scheme, the Purchaser has now floated this tender for procurement of Distribution Transformers.

2.0 SCOPE OF WORK

The scope shall include Design, Manufacture, Shop Testing at works of 100 KVA, 315 KVA & 500 KVA Distribution Transformers conforming to the Technical Specifications enclosed along with Packing, Forwarding, Freight and Insurance and Unloading and proper stacking at Purchaser's stores.

3.0 DISCLAIMER

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

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

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

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

4.0 COST OF BIDDING

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

B. BIDDING DOCUMENTS

5.0 BIDDING DOCUMENTS

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

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Volume - I

- (a) Invitation for Bids (IFB) - Section - I
- (b) Instructions to Bidders (ITB) - Section - II
- (c) General Conditions of Contract (GCC) - Section – III
- (d) Technical Specifications (TS) - Section - IV

Volume - II

- (a) Bid Form - Annexure – I
- (b) BG Formats - Annexure – II
- (c) Price Schedule - Annexure – III
- (d) GTP Formats - Annexure – IV
- (e) GTP Formats - Annexure – V
- (f) Past Performance Details - Annexure - VI

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

6.0 AMENDMENT OF BIDDING DOCUMENTS

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

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

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

C. PREPARATION OF BIDS

7.0 LANGUAGE OF BID

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

8.0 DOCUMENTS COMPRISING THE BID

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

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- (a) Bid Form, Price & other Schedules (STRICTLY AS PER FORMAT) and Technical Data Sheets completed in accordance with Clause 9.0, 10.0, 11.0 and Technical Specification;
- (b) All the Bids must be accompanied with the required bid security as mentioned in the Section-I against each tender.
- (c) Power of Attorney indicating that the person(s) signing the Bid have the authority to sign the Bid and thus that the Bid is binding upon the Bidder during the full period of its validity, in accordance with clause 12.0.

9.0 BID FORM

9.01 The Bidder shall complete an 'Original' and another one 'Copy' of the Bid Form and the appropriate Price & Other Schedules and Technical Data Sheets furnished in the Volume-II of the Bidding Documents.

9.02 Bid Security

Pursuant to Clause 8.0 (b) above, the bidder shall furnish, as part of its bid, a bid security amounting to 2% (Two percent) of the total bid value (FOR Destination) as already specified in the Section-I. The bid security is required to protect the Purchaser against the risk of Bidder's conduct which would warrant the security's forfeiture.

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

- (a) Bank Guarantee issued by any scheduled bank strictly as per the format enclosed and shall be valid for a period of thirty (30) days beyond the validity of the bid.
- (b) Bank Draft in favour of NESCO, payable at Bhubaneswar.

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

The successful bidder's bid security will be discharged upon furnishing the performance security as per clause 29.0.

The bid security may be forfeited :

- (a) if the Bidder:
 - i) withdraws its bid during the period of bid validity specified by the Bidder in the Bid Form; or
- (b) in the case of a successful Bidder, if the Bidder fails:
 - (i) to sign the Contract, or
 - (ii) to furnish the required performance security.

10.0 BID PRICES

10.01 Bidders shall quote with a break-up of prices for individual items. The total Bid Price shall also cover all the Supplier's obligations mentioned in or reasonably to be inferred from the Bidding Documents in respect of Design, Supply, Transportation to site, all in accordance with the requirement of Bidding Documents. The Bidder shall complete the appropriate Price Schedules included herein, stating the Unit Price for each item & total Price.

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

10.03 Prices quoted by the Bidder shall be "Firm" and not subject to any price adjustment during the performance of the Contract. A Bid submitted with an adjustable price quotation will be treated as non-responsive and rejected.

11.0 BID CURRENCIES

Prices shall be quoted in Indian Rupees Only.

12.0 PERIOD OF VALIDITY OF BIDS

12.01 Bids shall remain valid for 120 days from the date of opening of the Commercial Bid.

12.02 Notwithstanding Clause 12.01 above, the Purchaser may solicit the Bidder's consent to an extension of the Period of Bid Validity. The request and the responses thereto shall be made in writing by Fax/e-mail.

13.0 ALTERNATIVE BIDS

Bidders shall submit Bids, which comply with the Bidding Documents. Alternative Bids will not be considered. The attention of Bidders is drawn to the provisions of Clause 22.03 & 22.04 regarding the rejection of Bids, which are not substantially responsive to the requirements of the Bidding Documents.

14.0 FORMAT AND SIGNING OF BID

14.01 The original Bid Form and accompanying documents (as specified in Clause 9.0), clearly marked "Original Bid", plus one copy must be received by the Purchaser at the date, time and place specified pursuant to Clauses 15.0 and 16.0. In the event of any discrepancy between the original and the copies, the original shall govern.

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

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

D. SUBMISSION OF BIDS

15.0 SEALING AND MARKING OF BIDS

15.01 Bid submission: One original & one Copy (hard copies) of all the Bid Documents shall be sealed and submitted to the Purchaser before the closing time for submission of the bid. One set print out of Section III & Section IV of the Bid Document duly signed and stamped at every page shall have to be submitted along with the bid.

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15.02 The Technical Documents and the Bid Security shall be enclosed in a sealed envelope and the said envelope shall be superscribed with "Technical Bid & Bid Security". The price bid shall be inside another sealed envelope with superscription "Price Bid". Both these envelopes shall be sealed inside another big envelope. All the envelopes should bear the Name and Address of the Bidder and marking for the Original and Copy. The envelopes should be super-scribed with "Tender Notice No. & Due date of opening".

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

16.0 DEADLINE FOR SUBMISSION OF BIDS

16.01 The original Bid, together with the required copies, must be received by the Purchaser at the address specified no later than 1.00 PM. on 29.03.2008.

16.02 The Purchaser may, at its discretion, extend the deadline for the submission of Bids by amending the Bidding Documents in accordance with Clause 9.0, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

17.0 ONE BID PER BIDDER

Each Bidder shall submit only one Bid either by itself, or as a partner in a Joint Venture. A Bidder who submits or participates in more than one Bid will cause all those Bids to be rejected. However, the bidder may indicate separate prices for supply to WESCO, NESCO & SOUTHCO.

18.0 LATE BIDS

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

19.0 MODIFICATIONS AND WITHDRAWAL OF BIDS

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

19.02 No Bid may be modified to the deadline for Bids.

E EVALUATION OF BID

20.0 PROCESS TO BE CONFIDENTIAL

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

21.0 CLARIFICATION OF BIDS

To assist in the examination, evaluation and comparison of Bids, the Purchaser may, at its discretion, ask the Bidder for a clarification of its Bid. All responses to requests for clarification shall be in writing and no change in the price or substance of the Bid shall be sought, offered or permitted.

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22.0 PRELIMINARY EXAMINATION OF BIDS / RESPONSIVENESS

- 22.01 Purchaser will examine the Bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the Bids are generally in order.
- 22.02 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price per item that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price per item will be corrected. If there is a discrepancy between the Total Amount and the sum of the total price per item, the sum of the total price per item shall prevail and the Total Amount will be corrected.
- 22.03 Prior to the detailed evaluation, Purchaser will determine the substantial responsiveness of each Bid to the Bidding Documents including production capability and acceptable quality of the Goods offered. A substantially responsive Bid is one, which conforms to all the terms and conditions of the Bidding Documents without material deviation.
- 22.04 A Bid determined as not substantially responsive will be rejected by the Purchaser and / or the Purchaser and may not subsequently be made responsive by the Bidder by correction of the non-conformity.

23.0 EVALUATION AND COMPARISON OF BIDS

- 23.01 The evaluation of Bids shall be done based on the delivered cost competitiveness basis.
- 23.02 The evaluation of the Bids shall be a stage-wise procedure. The following stages are identified for evaluation purposes:

In the first stage, the Bids would be subjected to a responsiveness check. The Technical Proposals and the Conditional ties of the Bidders would be evaluated.

Subsequently, the Financial Proposals along with Supplementary Financial Proposals, if any, of Bidders with Techno-commercially Acceptable Bids shall be considered for final evaluation.

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

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

Bidders shall base their Bid price on the terms and conditions specified in the Bidding Documents.

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

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

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F. AWARD OF CONTRACT

24.0 CONTACTING THE PURCHASER

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

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

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

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

26.0 AWARD OF CONTRACT

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

27.0 THE PURCHASER'S RIGHT TO VARY QUANTITIES

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

28.0 LETTER OF INTENT/ NOTIFICATION OF AWARD

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

29.0 PERFORMANCE SECURITY

Within 15 days of the receipt of Notification of Award/ Letter of Intent from the Purchaser, the successful Bidder shall furnish the Performance Security in the form of Bank Guarantee for an amount of 10% (Ten percent) of the Contract Price in accordance with the General Conditions of Contract in the Performance Security Form provided in Vol.-II, Annexure - II of the Bidding Documents. Upon submission of the performance security, the bid security shall be released.

30.0 CORRUPT OR FRAUDULENT PRACTICES

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

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

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- (i) "Corrupt practice" means behavior on the part of officials in the public or private sectors by which they improperly and unlawfully enrich themselves and/or those close to them, or induce others to do so, by misusing the position in which they are placed, and it includes the offering, giving, receiving, or soliciting of anything of value to influence the action of any such official in the procurement process or in contract execution; and
 - (ii) "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Purchaser, and includes collusive practice among Bidders (prior to or after Bid submission) designed to establish Bid prices at artificial non-competitive levels and to deprive the Purchaser of the benefits of free and open competition.
- (b) Will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;
 - (c) Will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded an contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, an contract.

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

SECTION - III

**(GENERAL CONDITION OF CONTRACT)
2007-2008**

(Tender Notification : CSO/03/Distribution Transformer)

Date: 29.02.2008

Registered Office of NESCO, WESCO & SOUTHCO

GENERAL CONDITION OF CONTRACT (GCC)

1.0 General Instructions

- 1.01 All the Bids shall be prepared and submitted in accordance with these instructions.
- 1.02 Bidder shall bear all costs associated with the preparation and delivery of its Bid, and the Purchaser will in no case shall be responsible or liable for these costs.
- 1.03 The Bid should be submitted by the Bidder in whose name the bid document has been issued and under no circumstances it shall be transferred/sold to any other party.
- 1.04 The Purchaser reserves the right to request for any additional information and also reserves the right to reject the proposal of any Bidder, if in the opinion of the Purchaser, the data in support of Tender requirement is incomplete.
- 1.05 The Bidder is expected to examine all instructions, forms, terms & conditions and specifications in the Bid Documents. Failure to furnish all information required in the Bid Documents or submission of a Bid not substantially responsive to the Bid Documents in every respect may result in rejection of the Bid. However, the Purchaser's decision in regard to the responsiveness and rejection of bids shall be final and binding without any obligation, financial or otherwise, on the Purchaser.

2.0 Definition of Terms

- 2.01 "Purchaser" shall mean WESCO/ NESCO / SOUTHCO.
- 2.02 "Bidder" shall mean the firm who quotes against this bid document issued by the Purchaser. "Contractor" or "Seller" shall mean the successful Bidder and/or Bidders whose bid has been accepted by the Purchaser and on whom the "Letter of intent" is placed by the Purchaser and shall include his heirs, legal representatives, successors and permitted assigns wherever the context so admits.
- 2.03 "Site" shall mean the Electricity Distribution Area of the Company.
- 2.04 "Specification" shall mean collectively all the terms and stipulations contained in those portions of this bid document known as Instruction to Bidder, Bid form and other forms as per Volume - III, General Conditions of Contract, Specifications and the Amendments, Revisions, Deletions or Additions, as may be made by the Purchaser from time to time.
- 2.05 "Letter of Intent" shall mean the official notice issued by the Purchaser notifying the Contractor that his proposal has been accepted and it shall include amendments thereto, if any, issued by the Purchaser. The "Letter of Intent" issued by the Purchaser shall be binding on the "Contractor". The date of Letter of Intent shall be taken as the effective date of the commencement of contract.
- 2.06 "Purchase Order" shall mean the Purchase Order and amendments thereof and the drawings, specifications and other documents / papers referred to therein which shall constitute the "Contract".
- 2.07 "Month" shall mean the calendar month and "Day" shall mean the calendar day.
- 2.08 "Codes and Standards" shall mean all the applicable codes and standards as indicated in the Technical Specification.
- 2.09 "Offer Sheet" shall mean Bidder's firm offer submitted to Purchaser in accordance with the specification.
- 2.10 "Contract" shall mean THE "letter of Intent" issued by the Purchaser.

- 2.11 "Contract Price" shall mean the price referred to in the "Letter of intent".
- 2.12 "Contract Period" shall mean the period during which the "Contract" shall be executed as agreed between the Contractor and the Purchaser in the Contract inclusive of extended contract period for reasons beyond the control of the Contractor and/or Purchaser due to force majeure.
- 2.13 "Goods" shall mean all items to be supplied under Purchase Order whether raw materials, processes materials, equipment, fabricated products, drawings or other documents as applicable.
- 2.14 "Store" shall mean the Purchaser store as defined elsewhere in this tender document.

3.0 Contract Documents & Priority

- 3.01 Contract Documents: The Specification, terms and conditions of the contract shall consist solely of these Tender conditions and offer sheet.
- 3.02 Priority: Should there be any discrepancy between any term hereof and any term of the Offer Sheet, the terms of these tender document shall prevail.

4.0 Scope of Work

- 4.01 The "Scope of Work" shall be on the basis of Bidder's responsibility, completely covering the obligations, responsibility and workmanship, provided in this Bid Enquiry whether implicit or explicit.
- 4.02 The Purchaser reserves the right to vary the quantity i.e increase or decrease, which shall be communicated to successful bidder during project execution.
- 4.03 All relevant drawings, data and instruction manuals and other necessary inputs shall be under the scope of contract.

5.0 General Requirements

- 5.01 The contractor shall supply, deliver best quality goods.
- 5.02 The company also reserves the right to add from the scope of work or delete from the scope of work so assigned to the Supplier, if the circumstances so warrant.
- 5.03 The contractor shall be responsible for loading and unloading of all materials with proper material handling equipment.

6.0 Quality Assurance and Inspection

- 6.01 Immediately on award of contract, the bidder shall prepare detailed quality assurance plan / test procedure identifying the various stages of manufacture, quality checks performed at each stage, raw material inspection and the Customer hold points. The document shall also furnish details of method of checking, inspection and acceptance standards / values and get the approval of Purchaser before proceeding with manufacturing. However, Purchaser shall have the right to review the inspection reports, quality checks and results of contractors in house inspection department which are not Customer hold points and the contractor shall comply with the remarks made by purchaser or his representative on such reviews with regards to further testing, rectification or rejection, etc.
- 6.02 Witness and Hold points are critical steps in manufacturing, inspection and testing where the contractor is obliged to notify the Purchaser in advance so that it may be witnessed by the

Registered Office of NESCO, WESCO & SOUTHCO

Purchaser. Final inspection is a mandatory hold point. The contractor has to proceed with the work past a hold point only after clearance by purchaser or a witness waiver letter from Purchaser.

- 6.03 The performance of waiver of QA activity by Purchaser at any stage of manufacturing does not relieve the contractor of any obligation to perform in accordance with and meet all the requirements of the procurement documents and also all the codes & reference documents mentioned in the procurement document nor shall it preclude subsequent rejection by the purchaser.
- 6.04 On completion of manufacturing the items can be dispatched only after issue of shipping release by the Purchaser.
- 6.05 All testing and inspection shall be done without any extra cost.
- 6.06 Purchaser reserves the right to send any material out of the supply to any recognized laboratory for testing. In case the material is found not in order with the technical requirement / specification, the charges of testing along with any other penalty which may be levied is to be borne by the bidder. To avoid any conflict the Seller is advised to send his representative to the stores to see that the material sent for testing is being sealed in the presence of bidder's representative.

7.0 Packing, Packing List & Marking

- 7.01 **Packing:** Seller shall pack or shall cause to be packed all Commodities in such a manner as shall be reasonably suitable for shipment by road or rail to Orissa Distribution Companies without any risk of damage in transit. The packing shall be sufficient to withstand, without limitation, rough_handling during transit and exposure to extreme temperatures, salt and precipitation during transit, and open storage.
- 7.02 **Packing List:** One copy of the packing list shall be enclosed in each package delivered. There shall also be enclosed in one package a master packing list identifying each individual package, which is part of the shipment. On any packaging where it is not feasible to place the packing list inside the container, all pertinent information shall be stenciled on the outside and will thus constitute a packing list.
- 7.03 **Marking:** Seller shall mark each container, box or package for easy identification of his materials as follows:

Commodity Name:
Name of the Supplier:
Net Weight:
Size:

- 8.0 **Commissioning Spares :** The Seller shall replace, free of cost, any spares which may be found defective at the time of commissioning.

9.0 Price Basis

Bidders shall quote individual price breakup for the quoted items.

The price shall be inclusive of all taxes, Duties and other Levies of whatsoever nature, transportation to site and vice versa and in-transit Insurances.

The above Prices shall also include unloading and proper stacking at/ from Purchaser Stores to site / stores.

10.0 Terms of Payment

10.01 The Payment shall be made as under:

- a) 100% Payment with taxes & duties on Prorata basis within 45 days of receipt of goods in our specified stores in good condition subject to detailed verification thereof and approval of guarantee & test certificate.
- b) For claiming 100% payment a Bank Guarantee of 10% value of the value of the goods on prorate basis, is to be provided which shall remain valid for a period beyond 90 days from the warranty period as per clause no. 12.0. This BG is independent of the P.B.G prescribed in Clause-13.0

10.02 All Payments shall be made after certification from Purchaser's Engineer Incharge. All Payments are subject to receipt of correct Documents.

11.0 Price Validity

All bids submitted shall remain valid, firm and subject to unconditional acceptance by Purchaser for 120 days post bid opening date. For awarded Contract, the prices shall remain valid and firm till contract completion.

12.0 Warranty / Guarantee

12.01 The bidder shall guarantee for the equipments/workmanship for a minimum period of 30 months from the date of commissioning or 24 months from the date of last receipt goods at stores, whichever is earlier. The manufacturer shall guarantee to replace or repair to the satisfaction of the purchaser the defective parts at site free of cost within the above period. Should however, the manufacturer fails to do so within a reasonable time, the purchaser reserves the right to effect repair or replacement and recover such charges for repair or replacement from the contractor. Contractor shall submit a performance Guarantee of 10% of the order value valid for a period of 90 days beyond the expiry of the warranty period.

12.02 If during the defect liability period any services performed found to be defective, these shall be promptly rectified by contract its own cost (including the cost of dismantling and reinstallation) on the instruction of Purchaser.

13.0 Contract Performance Bank Guarantee

13.01 Within Fifteen (15) days from the date of the Award notice, Seller shall submit a Performance Bank Guarantee (PBG) in favour of Purchaser equivalent to Ten percent (10%) of the total price of the Contract (the "Performance Bank Guarantees"). The PBG shall be valid for a period of 90 days from the completion of delivery.

13.02 The Performance Bank Guarantee established under Clause 13.01 shall be forfeited without recourse to the seller and payable against the presentation by Purchaser to the bank with a claim that the seller has failed to comply with any term or condition set forth in the Contract.

13.03 The Performance Bank Guarantee established under will be automatically and unconditionally forfeited without recourse if Purchaser in its sole discretion determines that Seller has failed to comply with any Terms or Condition set forth in the contract.

13.04 The Performance Bank Guarantees will be released without interest within thirty (30) days from the last date up to which the Performance Bank Guarantee has to be kept valid (as defined in Clause 13.01).

14.0 TECHNICAL INFORMATION / DATA.

The company and the contractor, to the extent of their respective rights permitting to do so, shall exchange such technical information and data as is reasonably required by each party to perform its obligations and responsibilities. The company and the contractor agree to keep each other in confidence and to use the same degree of care as it uses with respect to its own proprietary data to prevent its disclosure to third parties of all technical and confidential information. The technical information, drawings, records and other document shall not be copied, transferred, traced or divulged and / or disclosed to third party in full / part not misused in any other form. This technical information, drawing etc. shall be returned to the company with all approved copies and duplicates. In the event of any breach of this contract, the contractor shall indemnify the company against any loss, cost of damages or claim by any party in respect of such breach

15.0 Effective Date of Commencement of Contract:

The date of the issue of the Letter of Intent/Purchase Order which ever is earlier shall be treated as the effective date of the commencement of contract.

16.0 Taxes & Duties :

All taxes, duties, levies of whatsoever nature, octroi, turnover tax, service tax, income tax, work contract tax etc., levied by State or Central Governments or local bodies shall be to the contractor 's account including any taxes, duties and levies which may be levied fresh by the Governments during currency of the Contract. The contractor shall furnish their Excise/Sales Tax registration number, PAN No. etc. in the bid documents as well as Invoice/Challans etc.

17.0 Delivery Schedule :

The full quantity of the equipments shall be delivered in a phased manner as per the minimum monthly delivery schedule mentioned below :

| Capacity | 1 st Month | 2 nd Month | 3 rd Month | 4 th Month | Total |
|----------|-----------------------|-----------------------|-----------------------|-----------------------|-------|
| 100 KVA | 20% | 25% | 25% | 30% | 100% |
| 315 KVA | 15% | 20% | 30% | 35% | 100% |
| 500 KVA | 15% | 20% | 30% | 35% | 100% |

18.0 Time – The Essence of Contract

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

19.0 Liquidated Damages (LD)

19.01 If supply of items / equipments is delayed beyond the supply schedule as stipulated in clause no. 17.0 or as mutually decided and stated in the purchase order/LOI, then the bidder shall be liable to pay to the Purchaser as LD for such delay, a sum of 1% of the contract price for every week delay or part thereof. The LD shall be computed on the undelivered value of goods as per the delivery schedule.

19.02 The total amount of LD for delay under the contract will be subject to a maximum of ten percent (10%) of the contract price

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19.03 The Purchaser may, without prejudice to any method of recovery, deduct the amount for such damages from any amount due or which may become due to the Contractor or from the Performance Bank Guarantee or file a claim against the contractor.

20.0 The Laws and Jurisdiction of Contract:

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

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

21.0 Events of Default

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

- (a) Seller fails or refuses to pay any amounts due under the Contract;
- (b) Seller fails or refuses to deliver Commodities conforming to this Bid document / specifications, or fails to deliver Commodities within the period specified in P.O. or any extension thereof
- (c) Seller becomes insolvent or unable to pay its debts when due, or commits any act of bankruptcy, such as filing any petition in any bankruptcy, winding-up or reorganization proceeding, or acknowledges in writing its insolvency or inability to pay its debts; or the Seller's creditors file any petition relating to bankruptcy of Seller;
- (d) Seller otherwise fails or refuses to perform or observe any term or condition of the Contract and such failure is not remediable or, if remediable, continues for a period of 30 days after receipt by the Seller of notice of such failure from Purchaser.

22.0 Consequences of Default.

- (a) If an Event of Default shall occur and be continuing, Purchaser may forthwith terminate the Contract by written notice.
- (b) In the event of an Event of Default, Purchaser may, without prejudice to any other right granted to it by law, or the Contract, take any or all of the following actions;
 - (i) present for payment, to the relevant bank the Performance Bank Guarantee;
 - (ii) purchase the same or similar Commodities from any third party; and/or
 - (iii) recover any losses and/or additional expenses Purchaser may incur as a result of Seller's default.

23.0 Force Majeure

23.01 The term "Force Majeure" as employed herein include, but are not limited to, acts of God or force of nature, landslide, earthquake, flood, fire, lightning, explosion, major storm (hurricane, typhoon, cyclone etc.) or major storm warning, tidal wave, shipwreck and perils of navigation, act of war (declared or undeclared) or public enemy, strike (excluding employee strikes, lockouts or other industrial disputes or action solely among employee of Contractor or its subcontractors) act or

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omission of sovereign states or those purporting to represent sovereign states, blockade, embargo, quarantine, public disorder, sabotage, accident or similar events beyond the control of the parties or either of them.

Force Majeure shall not include occurrences as follows:

- (a) Late delivery of materials caused by congestion at Seller's facilities or elsewhere, an oversold condition of the market, inefficiencies, or similar occurrences.
- (b) Late performance by Seller and/or Sub-Seller caused by unavailability of raw materials, supervisors or labour, inefficiencies or similar occurrences.
- (c) Mechanical breakdown of any item of Seller's or its Sub-Seller's equipment, plant or machinery.
- (d) Delays due to ordinary storm or inclement weather or
- (e) Non-conformance by Sub-Seller.

Unless the delay arises out of a Force Majeure occurrence and is beyond both Seller's and Sub-Seller's or Seller's control and an alternate acceptable source of services, equipment or material is unavailable. Additionally, Force Majeure shall not include financial distress of Seller or any Sub-Seller.

- 23.02 In the event of either party being rendered unable by Force Majeure to perform any obligation required to be performed by them under the Contract, the relative obligation of the party affected by such Force Majeure shall be suspended for the period during which such cause lasts. Time for performance of the relative obligation suspended by Force Majeure shall then stand extended by the period for which cause lasts.
- 23.03 Upon the occurrence of any Force Majeure event, the party so affected in the discharge of its obligation shall promptly, but no later than seven (7) days give written notice of such event to the other party. The affected party shall make every reasonable effort to remove or remedy the cause of such Force Majeure or mitigate its effect as quickly as possible. If such occurrence results in the suspension of all or part of the Work for a continuous period of more than, the parties shall meet and determine the measures to be taken.
- 23.04 Any delay or failure in performance by either party hereto shall not give rise to any claims for damages or loss of anticipated profits it, and to the extent, such delay or failure is caused by Force Majeure.

24.0 Transfer and Sub-Letting

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

25.0 THIRD PARTY INSURANCE

Contractor shall take the Insurance of Equipment during Transit. Any Claim pertaining to this shall be the responsibility of the Contractor.

26.0 Recoveries

When ever under this contract any money is recoverable from and payable by the bidder, the purchaser shall be entitled to recover such sum by appropriating in part or in whole by detecting any sum due to which any time thereafter may become due from the Seller in this or any other contract.

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Should the sum be not sufficient to cover the full amount recoverable the bidder shall pay to the purchaser on demand the remaining balance.

27.0 Waiver

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

28.0 Indemnification

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

28.02 Subject to this Clause 23.0 Purchaser shall, at its sole cost and expense, defend, indemnify and hold harmless Contractor and his assignees /or the employees of the Contractor whatsoever arising out of the negligence or willful act or omission or from the default of the Purchaser in the performance of the Contractor.

SECTION - IV

(TECHNICAL SPECIFICATIONS)

2007-2008

(Tender Notification : CSO/03/Distribution Transformer)

Date: 29.02.2008

A) TECHNICAL SPECIFICATION FOR 100 KVA, 11/0.433 THREE PHASE DISTRIBUTION TRANSFORMERS.

1. SCOPE :-

This specification covers design, manufacturing, testing and delivery of the Three Star rating 100 KVA, 11/0.433, three phase, oil immersed, Oil Natural (ON), outdoor type distribution transformers (conventional type) suitable for 11 KV and 50 Hz 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.

1.2 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.

1.3 The design and constructional aspects of materials shall not withstanding any anomalies, discrepancies, omissions, in-completeness, etc. in these specifications and 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 stipulations in that respect in the relevant Indian Standards, IEC standards, I.E. Rules, I.E. Act and other statutory provisions.

1.4 The Bidder / 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.

1.5 Tolerances:

The tolerance of guaranteed performance figures shall be as specified in the (Part-I) table 7 of latest issue of IS 2026 or relevant International Standard except wherever specified otherwise in this specification.

2. System Particulars :-

The transformers shall be suitable for outdoor installation with following system particulars and they should be suitable for service under fluctuations in supply voltage as permissible under Indian Electricity Rules.

| | | |
|--|---|----------------------------|
| ▪ Nominal System Voltage | : | 11Kv |
| ▪ Corresponding Highest System Voltage | : | 12Kv |
| ▪ Neutral earthing | : | Solidly earthed |
| ▪ Frequency | : | 50Hz with +/- 5% tolerance |
| ▪ Number of phase | : | 3 |

3. SERVICE CONDITIONS:

3.1 Equipment supplied against the specification shall be suitable for satisfactory operation under the following tropical conditions :-

| | | | |
|------|------------------------------|---|----------|
| i. | Max. Ambient air temperature | : | 50 Deg.C |
| ii. | Max. Relative humidity | : | 100 % |
| iii. | Max. Annual rainfall | : | 1450 mm |

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| | | | |
|-------|--|---|--|
| iv. | Max. Wind pressure | : | 150kg/sq.m |
| v. | Max. Altitude above mean sea level | : | 1000mtrs. |
| vi. | Isoceraunic level | : | 50 |
| vii. | Seismic level (Horizontal acceleration) | : | 0.3g. |
| viii. | Climatic Condition | | Moderately hot and humid tropical climate conducive to rust and fungus growth. |
| ix. | Reference Ambient Temperature for Temperature rise : | | 50 Deg C |

3.2 The climatic conditions are prone to wide variations in ambient conditions and hence the equipment shall be of suitable design to work satisfactorily under these conditions.

4. APPLICABLE STANDARDS:-

4.1 The design, manufacture and performance of the equipment shall comply with all currently applicable statutes, regulations and safety codes.

4.2 The Distribution Transformers shall conform to IS : 2026 as amended up to date or other International Standards for equal or better performance.

4.3 Unless otherwise specified, the equipment offered shall conform to latest applicable Indian, IEC, British or U.S.A. Standards and in particular, to the following :-

| | | |
|----|--|--|
| a. | IS 2026 (part I,II,IV)/1997, (Part-III)/1981, (Part-V)/1994 | Power & Distribution Transformer |
| b. | IS : 1180 / 1989 (part-1) | Outdoor type, Three phase distribution transformers up to and including 100 KVA, 11KV. |
| c. | IS : 335 / 1993 | New insulating oil – Specification (fourth revision) |
| d. | IS:2099/ 1986, IS:7421 – 1988, IS:3347 (Part-I/Sec-2)-1979, IS:3347 (part-I/Sec-I) – 1982 Amended up to date | Bushing |
| e. | IS 5 | Colours for ready mixed paints and enamels. |
| f. | IS 13730 (part – 27) 1996 | Specification for particular types of winding wires. |
| g. | IS : 3073 / 1974, IS : 3070 (Part – II) | Specifications for Lighting Arrestor |
| h. | CBIP Publication No. 295:2006 | Manual on transformers |

4.4 In case of conflict arising out due to variations between the applicable standard and the standards specified herein the provisions of this specification should prevail.

5. Specific Technical Requirement :

5.1 Standard KVA Ratings :-

The standard ratings for transformer shall be 100 KVA.

5.2 Nominal Voltage Ratings

- i. Primary voltage ; 11KV
- ii. Secondary voltage: 0.433 KV.

5.2.1 Winding connections :-

- i. H.V. Winding : Delta
- ii. L.V. Winding : Star

The neutral of the L.V. winding shall be brought out to a separate insulated terminal. The voltage group shall be Dyn -11.

5.3 Temperature Rise :

- i. The temperature rise for top oil over an ambient temperature of 50° C should be 35° C maximum (measured by thermometer in accordance with IS 2026 or relevant International Standard). i.e Max. Temp. of top oil shall not exceed 85° C.
- ii. Temperature rise for winding over an ambient temperature of 50° C should be 40° C maximum (measured by resistance method in accordance with IS 2026 or relevant International Standard). i.e. Max. Temp. of winding shall not exceed 90° C.

5.4 No Load Voltage Ratio :-

The no load voltage ratio shall be 11000/433 Volts

6. Design & Construction :-

6.1 Core

- i) The core shall be stacked type
 - a) For Stack core :- The core shall be of high grade cold rolled grain oriented (C.R.G.O) annealed steel lamination 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 permanency of the core losses with continuous working of the transformers.
 - b) The top yoke shall be one and no cut core shall be accepted in any case.
- ii) The grade of core laminations shall be M4 or better.

The grade of core laminations shall be required to submit the manufacturer's test report showing the watt Loss per kg and the thickness of the core lamination, to ascertain the quality of Core materials.

The purchaser reserves the right to get sample of the core material tested at any Government recognized laboratory.

- iii) The transformer core shall not be saturated for any value of V/f ratio to the extent of 112.5% of the rated value of V/f ration (i.e. 11000/50 or 22000/50) (due to combined effect of voltage and frequency) up to 12.5% without injurious heating at full load conditions and will not get saturated. The bidder shall furnish necessary design data in support of this situation.
- iv) Flux density :-

Flux density should not be more than 1.60 Tesla at the rated voltage and frequency. The value of the flux density allowed in the design shall be clearly stated in the offer along with graph.

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- v) The No load current at rated voltage shall not exceed the percentage given below.

AT Rated Voltage : 2.0% of the full load current in LT winding
At 112.5% Rated Voltage : 4% of the full load current

- vi) Number of steps of core shall be minimum of 7(seven) Standard steps

6.2 Winding:-

- i. Materials : Double paper covered Aluminum conductor shall be used HV and LV winding for 11kv class.
- ii. Current Density : Current density for HV and LV winding should not be more than 1.6A/sq.mm for Aluminum conductor.
- iii. L.V. Neutral formation shall be at top.

6.3 Losses:

The Total Losses (No load losses + Load Losses) 100 KVA, 11/0.433 KV and rated voltage shall not exceed the values indicated as below:

| NO LOAD LOSS (W) (max) | LOAD LOSSES (W) at 75° C (max) |
|---------------------------|-----------------------------------|
| 260 | 1760 |

No positive tolerance for losses of 11/0.433 kv. Distribution transformers as per IS : 1180 (Part 1) amended upto date. 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.

The values guaranteed in G.T.P. for flux density, no load current at rated voltage, no load current at 112.5% of rated voltage and no load loss at rated voltage shall be individually met.

6.4 Insulation material & clearances:

- i. Materials – Makes of Electrical grade insulating craft paper, press Board, Perma wood insulation shall be declared in GTP by the bidder. The test reports for all properties as per relevant I.S. amended up to date shall be submitted during inspection.
- ii. The electrical clearance between the winding and body of the tank (between inside surface of the tank and outside edge of the windings) should not be less than 25 mm for 11 KV class.

Minimum external clearances of bushing terminals

| | | |
|----|-----------|-------|
| HV | Ph to PH | 255mm |
| | Ph to E | 140mm |
| LV | Ph –to-Ph | 75mm. |
| | Ph to E | 40mm |

6.5 Impedance Value –

The percentage impedance at 75° C. shall be 4.5% for 100 KVA transformers with positive tolerance of 10%. No negative tolerance on percentage impedance is allowed.

7.0 Tank

7.0.1 The transformer tank shall be made up of prime quality M.S. sheets of rectangular shape. No other shape will be accepted. The transformer tank shall be of robust construction. All joints of tank and fittings should 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 means of the lifting lugs provided. Tank inside shall be painted by varnish. Top cover plate shall be slightly sloping; approximately 5 to 10 deg. Towards HV bushing and edges of cover plate should be bent downwards so as to avoid entry of water through the cover plate gasket. The width of bend plate shall be 25 mm min. the top cover shall have no cut at point of lifting lug. The rectangular tank shall be fabricated by welding at corners.

7.0.3 Two 'L' shaped sheet shall be jointed at corner only to provide rectangular shape. Horizontal or vertical joints in tank side walls and its bottom or top cover will be not allowed. In addition the cover of the main tank shall be provided with an air release plug.

Side wall thickness : 3.15 mm. (min)
Top and bottom plate thickness : 5 mm. (min.)

7.0.4 Reinforced by welded angle 40 x 40 x 6 MM on all the outside walls on the edge of tank to form two equal compartments. The permanent deflection is not more than 5 mm up to 750 mm length and 6mm up to 1250 mm length when transformer tank without oil is subject to air pressure of 35 Kpa above atmospheric pressure for 30 min. Pressure test shall be performed carefully at the time of 1st stage inspection only to confirm the adequacy of reinforcement angle and gauge of the tank and certified by inspector.

7.0.5 All welding operations to be carried out by MIG process.

7.0.6 Lifting lugs: 4 nos. welded heavy duty lifting lugs of MS plate of 8mm thickness suitably reinforced by vertical supporting flat of same thickness as of lug welded edgewise below the lug on the side wall, up to reinforcing angle. They shall be so extended that cutting of bend plate is not required.

7.0.7 Pulling lugs : 4 nos. of welded heavy duty pulling lugs of MS plate of 8mm thickness shall be provided to pull the transformer horizontally.

7.0.8 Top cover fixing bolts: GI nut bolts of 3/8" dia, with one plain washer shall be used for top cover fixing, spaced at 3" apart. 6mm neoprene bonded cork oil resistance gaskets conforming to type B/C IS 4253 Part-II amended up to date will be placed between tank and cover plate.

7.0.9 Vertical clearance ; - The height of the tank shall be such that minimum vertical clearance up to the top cover plate of 80 mm is achieved from top yoke.

7.0.10 Painting

All paints shall be applied in accordance with the paint manufacturer's recommendations. Particular attention shall be paid to the following:

- 7.0.11 a) Proper storage to avoid exposure as well as extremes of temperature.
- b) Surface preparation prior to painting.
- c) Mixing and thinning
- d) Application of paints and the recommended limit on time intervals between coats.
- e) Shelf life for storage.

7.0.12 All paints, when applied in normal full coat, shall be free from runs, sags, wrinkles, patchiness, brush marks or other defects.

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- 7.0.13 All primers shall be well marked into the surface, particularly in areas where painting is evident, and the first priming coat shall be applied as soon as possible after cleaning. The paint shall be applied by airless spray according to the manufacturer's recommendations. However, wherever airless spray is not possible, conventional spray be used with prior approval of purchaser.
- 7.0.14 The supplier shall, prior to painting protect nameplates, lettering gauges, sight glasses, light" fittings and similar such items.
- 7.0.15 Cleaning and Surface Preparation
- 7.0.16 After all machining, forming and welding has been completed, all steel work surfaces shall be thoroughly cleaned of rust, scale, welding slag or spatter and other contamination prior to any painting.
- 7.0.17 Steel surfaces shall be prepared by Sand/Shot blast cleaning or Chemical cleaning by Seven tank process including Phosphating to the appropriate quality.
- 7.0.18 The pressure and Volume of the compressed air supply for the blast cleaning shall meet the work requirements and shall be sufficiently free from all water contamination prior to any painting.
- 7.0.19 Chipping, scraping and steel wire brushing using manual or power driven tools cannot remove firmly adherent mill-scale and shall only be used where blast cleaning is impractical.
- 7.0.20 Protective Coating : As soon as all items have been cleaned and within four hours of the subsequent drying they shall be given suitable anticorrosion protection.
- 7.0.21 Paint Material : Followings are the type of paints that may be suitably used for the items to be painted at shop and supply of matching paint to site:
- i) Heat resistant paint (Hot oil proof) for inside surface.
 - ii) For external surfaces one coat of Thermo Setting Paint or 2 coats of Zinc chromate followed by 2 coats of Synthetic Enamel paint. The color of the finishing coats shall be dark admiral gray conforming to No.632 or IS 5: 1961.
- 7.0.22 Painting Procedure : All painting shall be carried out in conformity with both specifications and with the paint manufacture's recommendations. All paints in anyone particular system. Whether shop or site applied, shall originate from one paint manufacturer.
- 7.0.23 Particular attention shall be paid to the manufacture's instructions on storage, mixing, thinning and pot life. The paint shall only be applied in the manner detailed by the manufacturer e.g. brush, roller, conventional or airless spray and shall be applied under the manufacturer's recommended conditions. Minimum and maximum time intervals between coats shall be closely followed.
- 7.0.24 All prepared steel surfaces should be primed before visible re-rusting occurs or within 4 hours whichever is sooner. Chemical treated steel surfaces shall be primed as soon as the surface is dry and while the surface is warm.
- 7.0.25 Where the quality of film is impaired by excess film thickness,(wrinkling, mud cracking or general softness) the supplier shall remove the unsatisfactory paint coatings and apply another. As a general rule, dry film thickness should not exceed the specified minimum dry film thickness by more than 25%. In all instances, where two or more coats of the same paints are speciefies, such coatings mayor may not be of contrasting colors.
- 7.0.26 Paint applied to items that are not be painted, shall be removed at supplier's expense, avail the surface clean, un-stained and undamaged.
- 7.0.27 Damages to Paints Work : Any damage occurring to any part of the painting scheme shall be made good to the same standard of corrosion protection and appearance as that originally employed.

Any damaged paint work shall be made as follows:

- a) The damaged area, together with an area extending 25mm around its boundary, shall be cleaned down to bare metal.
- b) A priming coat shall immediately be applied, followed by a full paint finish equal to the originally applied and extending 50mm around the perimeter of the originally damaged.

The repainted surface shall present a smooth surface. This shall be obtained by carefully chamfering the paint edges before & after priming.

- 7.0.28 Dry Film Thickness : To the maximum extent practicable, the coats shall be applied as a continuous film of uniform thickness and free of pores. Over-spray, skips, runs, sags and drips should be avoided. The different coats may or may not be same color.

Each coat of paint shall be allowed to harden before the next is applied as per manufacturer's recommendations.

Particular attention must be paid to full film thickness at edges.

8.0 Heat Dissipation (Radiator) :

- a. Heat dissipation by tank walls excluding top and bottom should be 500W / sq.mtr..
- b. Heat dissipation by fin type (pressed steel) radiator 1.25 mm thick will be worked out on the basis of manufacturer's data sheet. The tenderer shall submit the calculation sheet with the offer or the offer shall stand rejected.
- c. Radiators shall be provided only on HV side and shall be of fin type. They should be fixed at right angle to the sides and not diagonally. The size of the radiator shall be such that it covers at least 50 % of the bottom yoke, full core and complete top yoke.

9.0 Conservator :

- a) The total volume of conservator shall be such as to contain 10% of total quantity of oil. Normally 3% quantity of the total oil will be contained in the conservator. Dimension of the conservator shall be indicated on the General Arrangement Drawing.
- b) Oil level indicator shall be provided on the side which will be with fully covered detachable flange with single gasket and tightened with MS nut-bolt.
- c) The inside diameter of the pipe connecting the conservator to the main tank shall be within 20 to 50mm and it should be project into the conservator in such way that its end is approximately 20mm above the top of the conservator so as to create a sump for collection of impurities. The minimum oil level (corresponding to (-) 5 deg.) should be above the sump level.
- d) The pipe from conservator tank connecting to main tank shall be minimum 25mm (min.) dia and shall have a slopping flap so that the oil falling from the pipe shall not fall directly on the active job and shall fall on the side walls only.
- e) The conservator shall be provided with the drain plug and a filling hole (30 mm dia) with cover.

10.0 Breather :

Breather joints will be screwed type. It shall have die-cast aluminum body or of Poly propylene materials and inside container for silica gel shall be of tin sheet, in case of aluminum die cast breather. Make of the breather shall be subject to purchaser's approval. Volume of breathers shall be suitable for 250 gm. Of silica gel. The make and design of breather shall be subject to approval of purchaser.

11.0 Terminals :

Brass rods 12mm diameter for HT with necessary nuts, check-nuts and plain thick tinned washer.

12.0 Bushings & Connections :

- 12.1 For 11 KV class 12KV bushing, shall be used and for 433 volts 1.1 KV bushing shall be used. Bushings of the same voltage class shall be interchangeable. Bushings with plain shed shall be as per relevant IS: 3347 amended up to date. HV bushings shall not be mounted on the top of the transformer tank & LV bushings shall be mounted outside of the transformer tank.
- 12.2 HV bushings shall be mounted on curvature shaped embossed plate, in such a way that all H.V. Bushings shall remain parallel and at equal-distance throughout. Bushings having type tested, as per relevant IS amended up to date shall only be acceptable.
- 12.3 The minimum creep age distance for both HV & LV Bushings shall not be less than 25mm per KV.

13.0 Internal connections :

13.1 H.V. Winding:

- i. In case of HV winding all jumpers from winding to bushing shall have cross section larger than winding conductor.
- ii. Inter coil connection shall be by crimping and brazing.
- iii. Lead from delta joint shall be connected to bushing rod by brazing only.

13.2 L.V. Winding :

- i. L.T. Star point shall be formed of Aluminum/Copper flat of sufficient length & size. Lead from winding shall be connected to the flat by crimping and brazing.
- ii. Firm connections of L.T. winding to bushing shall be made of adequate size of 'L' shaped flat. Connection of L.T. Coil lead to 'L' shape flat shall be by crimping and brazing. Alternatively 'L' shape lug of adequate capacity effectively crimped shall be acceptable.
- iii. 'L' shape flat/lug shall be clamped to L.V. Bushing metal part by using nut, lock-nut and washers.
- iv. For Aluminum windings, L&T Alkapee aluminum brazing rods with suitable flux shall be used. For copper winding crimping and silver brazing alloy shall be used.

14.0 Tank base channel:

It should be of two numbers of 75mm x 40mm channel for 100 KVA transformers.

15.0 Terminal Marking Plates and Rating Plates :

Terminals shall be provided with terminal marketing plates. The transformer shall be provided with riveted rating plate of minimum 8 SWG aluminum anodized material sheet in a visible position. The entries of the rating plate shall be in indelibly marked (i.e. by etching, engraving or stamping).

Marking as NESCO/WESCO/SOUTHCO and 'Sr.No.' of transformer shall be engraved on transformer main tank below L.T. bushings.

The name of the company, order No., capacity, month and year of manufacturing shall be engraved on separate plate which shall be firmly welded to main tank and shall form integral part of the tank. The detail drawings are to submitted by the bidder for approval.

16.0 Fittings:

The fittings on the transformers shall be as under :

| | | |
|----|------------------------------|-------|
| 1 | Rating and diagram plate | 1no. |
| 2. | Earthing terminals with lugs | 2 no. |
| 3. | Lifting lugs | 4 no. |

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| | | |
|-----|---|---|
| 4. | Oil filling hole with cap (on conservator) | 1 no. |
| 5. | Drain valve – 20mm for all T/Fs | 1no. |
| 6. | Conservator with drain plug. | 1 no. |
| 7. | Thermometer pocket | 1 no. |
| 8. | Explosion vent | 1 no. |
| 9. | Silica gel breather | 1no. |
| 10. | Platform mounting channel | 2 no. |
| 11. | Oil level gauge indicating 3 positions of oil marked as below : | 1 no. |
| | Minimum (-) 5°C. | |
| | Normal 30°C | |
| | Maximum 98° C | |
| 12. | HT & LT bushing | 3 nos. of HT bushing with Bi-metallic connector and 4 nos. of LT bushing shall be provided. Each bushing (HV & LV) should be provided with 3 nos. of brass nuts and 2 plain brass washers. |
| 13 | Radiators | As per Cl. No. 8 (B,C) |
| 14. | Lightening Arrestors for HT bushings | 1 set (3 nos) |
| 15. | Pulling lugs | 4 nos. |
| 16. | Metallic cover spot welded to tank for drain valve shall be provided. | |

17.0 Lightening Arrestors:

High surge capacity of 9 KV (Vrms), 5 KA (8/20 micro wave shape) Lightening Arrestor for 11 KV transformers conforming to IS : 3070/1974 shall be mounted on the transformers, clamped securely to the tank, to protect the transformer and associated line equipment from the occasional high voltage surges resulting from lighting or switching operations. The earthing terminal of the lightening arrestors shall be connected solidly to the transformer tank earthing in terminal. The bidder shall have to submit details such as make, type test reports and other technical details of Lighting Arrestors along with the technical bid.

18.0 Transformer Oil

Transformer oil to be used in all the Distribution transformers shall comply with the requirements of latest IS 335/1983 amended up to date thereof. In addition the oil should conform to 'Ageing Characteristics' specified below for New Oil and Oil in Transformers. Type test certificates of oil being used shall be produced to at the time of stage inspection.

New Oil-Ageing characteristics after accelerated ageing test 96 hrs. at 115 °C (open beaker method with copper catalyst):

- i. Specific Resistance (Resistivity).
 - a) at 20° C :- 2.5×10^{12} Ohm-Cm (Min)
 - b) at 90° C :- 0.2×10^{12} Ohm-Cm (Min)
- ii. Dielectric dissipation factor – 0.20 (Max. tandelta) 1t 90°C.
- iii. Total acidity mg/KOH/gm-0.05 (Max.)
- iv. Total sludge value (%) by weight – 0.05 (Max.)
- v. The method of testing these aging characteristics is given in Appendix – C of IS 335 amended up to date.
- vi. Oil filled in Transformers : The important characteristics of the transformer oil after it is filled in the transformer (within 3 months of filling) shall be as follows:-

| Sr. | Characteristics | Specifications |
|-----|-----------------|----------------|
|-----|-----------------|----------------|

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| No. | | |
|-----|---|------------------------|
| 1. | Electric Strength (Breakdown voltage) | 30 kV (Min) |
| 2. | Dielectric dissipation factor (Tan Delta) at 90 deg.C.) | 0.01 (Max) |
| 3. | Specific Resistance (Resistivity) at 27 deg. C (ohm-cm) | 10×10^{12} |
| 4. | Flash Point, P.M. (Closed) | 140° C (Min) |
| 5. | Inter facial tension at 27°C | 0.03 N/M (Min) |
| 6. | Neutralization value (total acidity) | 0.05 Mg. KOH/gm (Max.) |
| 7. | Water content PPM | 35 (Max.) |

19.0 Test and Inspection :-

19.01 Testing facility

The bidder should have adequate testing facility for all routine and acceptance tests and also arrangement for measurement of losses, resistance, etc. details of which will be enumerated in the tender.

19.02 The inspector of the purchaser will witness routine & type tests. In order to facilitate this, the manufacturer shall give a 15 days notice that the material is ready for inspection & testing. The material shall be dispatched only after approval of such test reports and issue of Dispatch clearances by the purchaser. However the purchaser reserves the right to retest the transformers after delivery at any National Accredited Testing Laboratory in case of any disputes regarding guaranteed specifications of supplied transformers at a later date during guarantee period. The cost of such retesting shall be borne by the supplier.

19.03 Routine Tests :-

- i. All transformers shall be subjected to the following routine tests at the manufacturer's works. The tests are to be carried out in accordance with the details specified in IS 2026 or as agreed upon between the purchaser and the manufacturer.
 - a) Measurement of winding resistance.
 - b) Ratio, polarity and phase relationship.
 - c) Impedance voltage.
 - d) Load losses.
 - e) No-load losses and No-load current.
 - f) Insulation resistance.
 - g) Induced over voltage withstand.
 - h) Separate source voltages withstand.
- ii. All the routine tests shall be conducted in the suppliers' laboratory at their cost.
- iii. Heat run test shall be arranged free of cost on the unit selected from the 1st lot by Authorized Representative.
- iv. The calculations to confirm the thermal ability as per Clause no. 9.1 of latest IS: 2026 Part-I or equivalent International Standard shall be submitted to our representative.

19.04 Type Tests :

The bidder should submit the report of following tests carried out in a NABL accredited laboratory :-

- a) Temperature Rise Test
- b) Short Circuit Test containing the measured no load loss and load loss.
- c) Impulse Test

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The balance type tests as stated below, should be carried at the manufacturer's works invariably in the presence of representative of the purchaser at the time of inspection from the first lot.

- i. Temperature Rise Test.
- ii. Air pressure test as per clause no.22.5 of IS:1180 (Part-I)/1989.
- iii. Unbalanced current test.

In respect of the successful bidder, the purchaser reserves the right to demand repetition of some or all the above tests in presence of the purchaser's representative. In case the unit fails in the type tests or routine tests, the complete lot offered shall be rejected.

19.05 Submission Routine Test Certificate

The successful bidder shall submit the routine test certificate along with documentary evidence for having paid the Excise Duty for the following raw materials viz. Oil, Aluminum, copper for conductors, insulating materials, core materials, bushings at the time of routine testing of the fully assembled transformer.

19.06 Stage Inspection

19.05.1 Supplier shall give 15 days' advance intimation to the purchase dept. to organize stage inspection in which assembly of core, windings and other core materials etc. would be inspected. In respect of raw materials such as core stamping, winding conductor, oil etc. successful bidder shall use these materials manufactured/supplied by the standard manufacturers and furnish the manufacturer's test certificates, as well as, proof of purchase from those manufacturers documentary evidence for having paid the excise duty for the information of the department. Purchaser will depute his representative at the time of stage inspection.

19.05.2 A minimum of 10% of the transformers from the offered lot will be tested for acceptance tests at factory, in the presence of purchaser's representative before dispatch.

19.05.3 The inspection may be carried out by the purchaser at any stage of manufacture. The successful bidder shall grant free access to the purchaser's representatives at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by the purchaser shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications and shall not prevent subsequent rejection if the equipment is found to be defective.

19.05.4 The purchaser may at its option, open a transformer supplied to the Stores, in presence of supplier at site or at Stores. If any of the technical particulars are seen to be in variance than the guaranteed technical particulars, the whole lot of transformer will be rejected without any liability on purchaser.

19.05.5 Testing of all Distribution Transformers for no load and full load losses.

After inspection of new transformers at factory for acceptance of the lot, all distribution transformers from the lot will be tested for no load and full load losses at all stores. Bidder has the liberty to be present at the time of testing.

19.05.6 Inspection & testing of Transformer Oil :

The bidder shall make arrangements for testing of transformer oil to be used in the transformers testing will be done in presence of purchaser's representative.

To ascertain quality of transformer oil, original manufacturer's test report should be furnished to (Testing) at the time of factory inspection for acceptance of the lot.

19.07 Rejection :-

Apart from rejection due to failure of the transformer to meet the specified test requirements the transformer shall be liable for rejection on any one of the following reasons.

- i. Losses exceed the specified values mentioned in specification.
- ii. Impedance voltage value exceeds the guaranteed value plus tolerances as per specification.
- iii. Type test are not carried out as per the specification.
- iv. Drawings are not submitted as per the specification.
- v. GTP not submitted as per the specification.
- vi. Heat dissipation calculation sheet are not submitted as per the specification.

19.06 Quality Assurance

- a) The bidder shall invariably furnish Test certificates and information as following along with the offer failing to which the offer will be rejected.
 - i. Aluminium and copper conductor.
 - ii. Transformer oil.
 - iii. Core
 - iv. Insulating paper
 - v. Porcelain Bushings
 - vi. Steel Plate used for Tank.
 - vii. List of testing & measuring equipments indicating the make, type, year of manufacture, Last date of Calibration, Name of the agency carried out the calibration etc. Purchaser reserves the right to visit the works of manufacturer to ensure the available testing facility prior to placement of order.
- b) Names of the supplier for the raw materials, list of standard accordingly to which the raw materials are tested, list of test normally carried out on raw materials in presence of bidder's representatives, copies of type test certificates.
- c) Information and copies of test certificate as in (i) above respect of bought out accessories including terminal connectors.
- d) List of manufacturing facilities available. In this list the bidder shall specifically mention whether lapping machine, vacuum drying plant, air conditioned dust free room with positive air pressure for provision of provision of insulation and winding etc. are available with him.
- e) Level of automation achieved and list of areas where manual processing still exists.
- f) List of areas in manufacturing process where stage inspection are normally carried out for quality control and details of such tests and inspections.
- g) Special features provided in the equipments to make it maintenance free.
- h) List of testing equipment available with the bidder for final testing of transformers and test plant limitation, if any, vis-à-vis the type, special acceptance and routine tests specified in the relevant standards and the present specification.

19.07 Drawings :-

A set of following drawings with all dimensions shall be submitted by the Bidder along with the offer :

- a) General Dimensional drawing.
- b) Core Assembly drawing.
- c) Internal Construction Drawing.
- d) Rating & Diagram Plate Drawing.
- e) HV/LV Bushings indicating measurement of creep age distances.
- f) Operation and Maintenance Manual.

The drawings shall be of A-3 (420x297mm) size only. The bidder should also supply along with his offer the pamplete/ literatures etc. for fittings/accessories.

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The bidder should not change design once offered as per A/T, Approved drawings and Type Test Reports.

The successful Bidders shall submit complete set of Drawings of transformer in triplicate indicating dimensions for approval and get approved it before offering 1st stage inspection.

20.0 Performance Guarantee:

All transformers supplied against this specification shall be guaranteed for a period of 30 months from the date of receipt at the consignee's Stores Center or 24 months from the date of commissioning, whichever is earlier. However, any engineering error, omission, working provisions, etc. which do not have any effect on the time period, shall be attended to as and when observed / pointed out without any price implication.

21.0 COST DATA SHEET:-

The bidders shall submit the cost data sheets indicating the break up prices and quantity of each raw material and components along with the unit rates required for manufacture the offered transformers along with the offer. The cost data sheet format is enclosed herewith. If the rates quoted are not justified with the cost data sheets, the offer shall not be considered for evaluation and placement of the order.

22.0 NON COMPLIANCE SCHEDULE

On this schedule the bidder shall provide a list of non compliance with this specification, documenting the effects that such non compliance is likely to have on the equipment's life and operating characteristics. Each Non Compliance shall refer to the relevant clause of the specification.

Where there are no deviations from specifications, the bidder shall so indicate by stating "No deviations" in this schedule.

| Clause No. | Non Compliance |
|------------|----------------|
| | |

23.0 Type Test Certificates Schedule

23.1 On this schedule a list of the test certificates included with the bid shall be provided. Each certificate listed shall be referred to the relevant specification clause and item of equipment to which the test applies.

| Sl. No. | Particular of Test | Type Test Certificate Ref | Year of Test |
|---------|--------------------|---------------------------|--------------|
| | | | |

23.2 In case of any doubt in the Type test reports submitted by the bidder, the Purchaser reserves the right to verify the original Type Test Reports, as well as to refer to the concerned laboratory directly without recourse to be bidder.

24.0 CAPITALISATION OF LOSSES AND LIQUIDATED DAMAGES FOR EXCESSIVE LOSSES

24.1 LOSSES:

Transformer with lower losses shall be preferred. The bidder shall indicate the values of load and no load losses of the transformer in his bid.

24.2 CAPITALIZATION OF LOSSES

For total cost evaluation, the capitalized cost of losses will be taken into account as per the following:

Capitalized Cost of Transformer = Cost of Transformer (as per Bid) + A x W_i + B x W_e

- a. Where W_i = No Load losses in KW & A = Rs. 1,52,847.00 for no load losses.
- b. W_e = Load losses in KW & B = Rs. 20,175.00 for load losses.

The no load loss in KW at rated voltage & frequency and the load loss in KW at rated current, rated frequency, rated output and at 75° C shall be quoted and these figures shall be guaranteed.

24.3 LIQUIDATED DAMAGE

Liquidated damages for non-performance of transformers shall be recovered from the supplier in case he is unable to achieve the quoted guaranteed loss figures at the rate equivalent to the double of the rate considered for evaluation i.e. at the following rates:

- a) For each KW of excess in no load losses: Rs. 3,05,694.00
- b) For each KW of excess in load losses: Rs. 40,350.00

However, the Purchaser reserves the right to reject the transformer outrightly, if any of the losses, i.e. no load loss or load loss or both exceed(s) the specified maximum permissible loss as mentioned in the technical specification.

B) TECHNICAL SPECIFICATION OF 315 KVA & 500 KVA DISTRIBUTION TRANSFORMER.

1.0 SCOPE :-

- 1.1 This specification covers design, manufacturing, testing and delivery of the 315 & 500 KVA, 11/0.433, three phase, oil immersed, Oil Natural Air Natural (ONAN), outdoor type distribution transformers (conventional type) suitable for 11 KV and 50 Hz distribution system.
- 1.2 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.
- 1.3 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.
- 1.4 The design and constructional aspects of materials shall not withstanding any anomalies, discrepancies, omissions, in-completeness, etc. in these specifications and 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 stipulations in that respect in the relevant Indian Standards, IEC standards, I.E. Rules, I.E. Act and other statutory provisions.
- 1.5 The Bidder / supplier shall bind himself 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.
- 1.6 Tolerances:
The tolerance of guaranteed performance figures shall be as specified in the (Part-I) table 7 of latest issue of IS 2026 or relevant International Standard except wherever specified otherwise in this specification.

2. System Particulars:-

The transformers shall be suitable for outdoor installation with following system particulars and they should be suitable for service under fluctuations in supply voltage as permissible under Indian Electricity Rules.

| | | |
|--|---|-------------------------------|
| ▪ Nominal System Voltage | : | 11Kv |
| ▪ Corresponding Highest System Voltage | : | 12Kv |
| ▪ Neutral earthing | : | Solidly earthed |
| ▪ Frequency | : | 50Hz with $\pm 5\%$ tolerance |
| ▪ Number of phase | : | 3 |

3. SERVICE CONDITIONS:

- 3.1 Equipment supplied against the specification shall be suitable for satisfactory operation under the following tropical conditions :-

| | | |
|---------------------------------|---|------------|
| i. Max. Ambient air temperature | : | 50 deg.C |
| ii. Max. Relative humidity | : | 100 % |
| iii. Max. Annual rainfall | : | 1450 mm |
| iv. Max. Wind pressure | : | 150kg/sq.m |

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| | | | |
|-------|--|---|--|
| v. | Max. Altitude above mean sea level | : | 1000mtrs. |
| vi. | Isoceraunic level | : | 50 |
| vii. | Seismic level (Horizontal acceleration) | : | 0.3g. |
| viii. | Climatic Condition | : | Moderately hot and humid tropical climate conducive to rust and fungus growth. |
| x. | Reference Ambient Temperature for Temperature rise : | : | 50 Deg C |

3.3 The climatic conditions are prone to wide variations in ambient conditions and hence the equipment shall be of suitable design to work satisfactorily under these conditions.

4. APPLICABLE STANDARDS:-

The design, manufacture and performance of the equipment shall comply with all currently applicable statutes, regulations and safety codes.

The Distribution Transformers shall conform to IS: 2026 as amended up to date or other International Standards for equal or better performance.

Unless otherwise specified, the equipment offered shall conform to latest applicable Indian, IEC, British or U.S.A. Standards and in particular, to the following :-

| | | |
|----|--|--|
| a. | IS 2026 (part I,II,IV)/1997, (Part-III)/1981, (Part-V)/1994 | Power & Distribution Transformer |
| b. | IS : 1180 / 1989 (part-1) | Outdoor type, Three phase distribution transformers up to and including 100 KVA, 11KV. |
| c. | IS : 335 / 1993 | New insulating oil – Specification (fourth revision) |
| d. | IS:2099/ 1986, IS:7421 – 1988, IS:3347 (Part-I/Sec-2)-1979, IS:3347 (part-I/Sec-I) – 1982 Amended up to date | Bushing |
| e. | IS 5 | Colours for ready mixed paints and enamels. |
| f. | IS 13730 (part – 27) 1996 | Specification for particular types of winding wires. |
| g. | IS : 3073 / 1974, IS : 3070 (part – II) | Specifications for Lighting Arrestors |
| h. | CBIP Publication No. 295:2006 | Manual on transformers |

In case of conflict arising out due to variations between the applicable standard and the standards specified herein the provisions of this specification should prevail.

5. Specific Technical requirement:

- a) Standard KVA Ratings :- The standard ratings for transformer shall be 315 & 500 KVA.
- b) Nominal voltage ratings : Primary voltage : 11KV, Secondary voltage: 0.433 KV.
- c) Winding connections :-
 - i. H.V. Winding : Delta
 - ii. L.V. Winding : Star

The neutral of the L.V. winding shall be brought out to a separate insulated terminal. The vector group shall be DYn –11.

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- d) Temperature Rise :
- i. The temperature rise for top oil over an ambient temperature of 50° C should be 35° C maximum (measured by thermometer in accordance with IS 2026 or relevant International Standard). i.e Max. Temp. of top oil shall not exceed 85° C.
 - ii. Temperature rise for winding over an ambient temperature of 50° C should be 40° C maximum (measured by resistance method in accordance with IS 2026 or relevant International Standard). i.e. Max. Temp. of winding shall not exceed 90° C.
- e) No load voltage ratio :- The no load voltage ratio shall be 11000/433 Volts
- f) Tapping :- Off-load tap changer from range + 2.5% to – 7.5% of HV variation with a step of 2.5% each.

6. Design & construction

6.1 Core

- i) The core shall be stacked type
- a) For Stack core :- The core shall be of high prime grade cold rolled grain oriented (C.R.G.O) annealed steel lamination 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 permanency of the core losses with continuous working of the transformers.
 - b) The construction of Top/Bottom yoke shall be one.No cut core shall be allowed by any case.
- ii) The grade of core laminations shall be M4 or better. The grade of core laminations shall be required to submit the manufacturer's test report showing the watt Loss per kg and the thickness of the core lamination, to ascertain the quality of Core materials. The purchaser reserves the right to get sample of the core material tested at any Government recognized laboratory.
- iii) The transformer core shall not be saturated for any value of V/f ratio to the extent of 112.5% of the rated value of V/f ration (i.e. 11000/50 or 22000/50) (due to combined effect of voltage and frequency) up to 12.5% without injurious heating at full load conditions and will not get saturated. The bidder shall furnish necessary design data in support of this situation.
- iv) Flux density :-
- Flux density should not be more than 1.60 Tesla at the rated voltage and frequency. The value of the flux density allowed in the design shall be clearly stated in the offer along with graph.
- v) The No load current at rated voltage shall not exceed the percentage given in Table bellow.

| Sr. No. | KVA Rating | AT Rated Voltage | At 112.5% Rated Voltage |
|---------|------------|--|-------------------------------|
| 1 | 315 | 1.5% of the full load current in LT winding | 3% of the full load current |
| 2 | 500 | 1.25% of the full load current in LT winding | 2.5% of the full load current |

- vi) Number of steps of core shall be minimum of 9 (minimum) Standard steps

Note: In case if it is found at any stage that the core used is defective/second used/scrap core or No load loss found to be more than stipulated limits, the supplier is liable for imposing penalty and even blacklisting the firm at the discretion of Purchaser.

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6.2 Winding:-

- Materials : Double paper covered Copper conductor shall be used for HV and LV winding..
- Current Density : Current density for HV and LV winding or any part should not be more than 2.8 A/sq.mm on any working tap including extreme tap.
- L.V. Neutral formation shall be at top.
- Vertical ducts & sufficient spacers should be provided between HV & LV windings.
- The current density of delta lead shall not exceed 2.5 A/mm²
- The no of LV coil and HV coil in one limb shall be 1 & 6 respectively in each case.

6.3 Losses:

The Losses shall not exceed the values given below

| KVA | NO LOAD LOSS (W) (Max) | LOAD LOSSES (W) at 75°C (Max) |
|-----|------------------------|-------------------------------|
| 315 | 800 | 4600 |
| 500 | 1100 | 6500 |

No tolerance for losses of 11/0.433 kv. Distribution transformers as per IS : 1180 (Part 1) amended upto date. 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.

The values guaranteed in G.T.P. for flux density, no load current at rated voltage, no load current at 112.5% of rated voltage and no load loss at rated voltage shall be individually met.

6.4 Insulation material & clearances:

- Materials – Makes of Electrical grade insulating craft paper, press Board, Perma wood/ Haldi wood insulation shall be declared in GTP by the bidder. The test reports for all properties as per relevant I.S. amended up to date shall be submitted during inspection.
- The electrical clearance between the winding and body of the tank (between inside surface of the tank and outside edge of the windings) should not be less than 25 mm for 11 KV class.

Minimum external clearances of bushing terminals

| | | |
|----|-----------|-------|
| HV | Ph to PH | 255mm |
| | Ph to E | 140mm |
| LV | Ph -to-Ph | 75mm. |
| | Ph to E | 40mm |

- The clearance between HV coil & Top/Bottom yoke shall be 25 mm (min).
- Inter coil insulation shall not be less than 9 mm.
- The insulation between core & LV shall be 4 mm (min).
- The insulation between HV coil & LV coil shall be 11 mm (min).
- Minimum 8 nos. of wedges to be provided.

6.5 Impedance Value –

The percentage impedance at 75° C. shall be 5% for 315 KVA & 500 KVA transformers with positive tolerance of 10%. No negative tolerance on % impedance is allowed.

6.6 Tank

6.6.1 The transformer tank shall be made up of prime quality, High grade, low carbon steel plate & suitable for welding. The transformer tank shall be of robust construction. All joints of tank and fittings should 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 means of the lifting lugs provided. Tank inside shall be painted by hot oil resistant varnish or paint. Top cover plate shall be slightly sloping; approximately 5 to 10 deg. Towards HV bushing and edges of cover plate should be bent downwards so as to avoid entry of water through the cover plate gasket. The width of bend plate shall be 25 mm min. the top cover shall have no cut at point of lifting lug. The rectangular tank shall be fabricated by welding at corners.

6.6.2 The tank should be of rectangular shape. Horizontal or vertical joints in tank side walls and its bottom or top cover will be not allowed. In addition the cover of the main tank shall be provided with an air release plug.

Side wall thickness : 3.15 mm. (min)
Top and bottom plate thickness : 5 mm. (min.)

6.6.3 Reinforced by welded angle 50X50X6 MM on all the outside walls on the edge of tank to form two equal compartments. The permanent deflection is not more than 5 mm up to 750 mm length and 6mm up to 1250 mm length when transformer tank without oil is subject to air pressure of 35 Kpa above atmospheric pressure for 30 min. Pressure test shall be performed carefully at the time of 1st stage inspection only to confirm the adequacy of reinforcement angle and gauge of the tank and certified by inspector.

6.6.4 All welding operations to be carried out by MIG process.

6.6.5 Lifting lugs: 4 nos. welded heavy duty lifting lugs of MS plate of 10 mm thickness suitably reinforced by vertical supporting flat of same thickness as of lug welded edgewise below the lug on the side wall, up to reinforcing angle. They shall be so extended that cutting of bend plate is not required.

6.6.6 Pulling lugs : 4 nos. of welded heavy duty pulling lugs of MS plate of 8mm thickness shall be provided to pull the transformer horizontally in length side.

6.6.7 Top cover fixing bolts: GI nut bolts of 3/8" dia, with one plain washer shall be used for top cover fixing, spaced at 2 1/2" apart. 6mm neoprene bonded cork oil resistance gaskets conforming to type B/C IS 4253 Part-II amended up to date will be placed between tank and cover plate.

6.6.8 All pipes, radiators stiffeners which are welded to the tank wall shall be welded externally & shall be double welded wherever possible. All welds shall be stress relieved.

6.6.9 Vertical clearance ; - The height of the tank shall be such that minimum vertical clearance up to the top cover plate of 80 mm is achieved from the top of the tap changer.

6.7 Painting

6.7.1 All paints shall be applied in accordance with the paint manufacturer's recommendations. Particular attention shall be paid to the following:

- a) Proper storage to avoid exposure as well as extremes of temperature.
- b) Surface preparation prior to painting.
- c) Mixing and thinning
- d) Application of paints and the recommended limit on time intervals between coats.
- e) Shelf life for storage.

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- 6.7.2 All paints, when applied in normal full coat, shall be free from runs, sags, wrinkles, patchiness, brush marks or other defects.
- 6.7.3 All primers shall be well marked into the surface, particularly in areas where painting is evident, and the first priming coat shall be applied as soon as possible after cleaning. The paint shall be applied by airless spray according to the manufacturer's recommendations. However, wherever airless spray is not possible, conventional spray be used with prior approval of purchaser.
- 6.7.4 The supplier shall, prior to painting protect nameplates, lettering gauges, sight glasses, light" fittings and similar such items.
- 6.7.5 Cleaning and Surface Preparation : After all machining, forming and welding has been completed, all steel work surfaces shall be thoroughly cleaned of rust, scale, welding slag or spatter and other contamination prior to any painting.
- 6.7.6 Steel surfaces shall be prepared by Sand/Shot blast cleaning or Chemical cleaning by Seven tank process including Phosphating to the appropriate quality.
- 6.7.7 The pressure and Volume of the compressed air supply for the blast cleaning shall meet the work requirements and shall be sufficiently free from all water contamination prior to any painting.
- 6.7.8 Chipping, scraping and steel wire brushing using manual or power driven tools cannot remove firmly adherent mill-scale and shall only be used where blast cleaning is impractical.
- 6.7.9 Protective Coating : As soon as all items have been cleaned and within four hours of the subsequent drying they shall be given suitable anticorrosion protection.
- 6.7.10 Paint Material : Followings are the type of paints that may be suitably used for the items to be painted at shop and supply of matching paint to site:
- i) Heat resistant paint (Hot oil proof) for inside surface.
 - ii) For external surfaces one coat of Thermo Setting Paint or 2 coats of Zinc chromate followed by 2 coats of Synthetic Enamel paint. The color of the finishing coats shall be dark admiral gray conforming to No.632 or IS 5: 1961.
- 6.7.11 Painting Procedure : All painting shall be carried out in conformity with both specifications and with the paint manufacture's recommendations. All paints in anyone particular system. Whether shop or site applied, shall originate from one paint manufacturer.
- 6.7.12 Particular attention shall be paid to the manufacture's instructions on storage, mixing, thinning and pot life. The paint shall only be applied in the manner detailed by the manufacturer e.g. brush, roller, conventional or airless spray and shall be applied under the manufacturer's recommended conditions. Minimum and maximum time intervals between coats shall be closely followed.
- 6.7.13 All prepared steel surfaces should be primed before visible re-rusting occurs or within 4 hours whichever is sooner. Chemical treated steel surfaces shall be primed as soon as the surface is dry and while the surface is warm.
- 6.7.14 Where the quality of film is impaired by excess film thickness,(wrinkling, mud cracking or general softness) the supplier shall remove the unsatisfactory paint coatings and apply another. As a general rule, dry film thickness should not exceed the specified minimum dry film thickness by more than 25%. In all instances, where two or more coats of the same paints are specifies, such coatings mayor may not be of contrasting colors.
- 6.7.15 Paint applied to items that are not be painted, shall be removed at supplier's expense, avail the surface clean, un-stained and undamaged.

- 6.7.16 Damages to Paints Work : Any damage occurring to any part of the painting scheme shall be made good to the same standard of corrosion protection and appearance as that originally employed.

Any damaged paint work shall be made as follows:

- a) The damaged area, together with an area extending 25mm around its boundary, shall be cleaned down to bare metal.
- b) A priming coat shall immediately applied, followed by a full paint finish equal to the originally applied and extending 50mm around the perimeter of the originally damaged.

The repainted surface shall present a smooth surface. This shall be obtained by carefully chamfering the paint edges before & after priming.

- 6.7.17 Dry Film Thickness : To the maximum extent practicable, the coats shall be applied as a continuous film of uniform thickness and free of pores. Over-spray, skips, runs, sags and drips should be avoided. The different coats may not be same color.

Each coat of paint shall allowed to hardened before the next is applied as per manufacture's recommendations.

- 6.7.18 Particular attention must be paid to full film thickness at edges.

6.8 Heat Dissipation (Radiator) :

- a) Heat dissipation by tank walls excluding top and bottom should be 500W / sq.m.
- b) Heat dissipation by fin type (pressed steel) radiator 1.25 mm thick will be worked out on the basis of manufacturers data sheet. The tendered shall submit the heat dissipation calculation sheet with the offer or the offer shall stand rejected.
- c) Radiators shall be provided only on HV side and shall be of fin type. They should be fixed at right angle to the sides and not diagonally. The size of the radiator shall be such that it covers at least 50 % of the bottom yoke, full core and complete top yoke.

6.9 Conservator :

- a) The total volume of conservator shall be such as to contain 10% of total quantity of oil in the tank. It should have the capacity between the highest & lowest visible levels to meet the requirement of expansion of the total cold oil volume in the transformer & cooling equipment from the minimum ambient temperature i.e -5 deg.C to 98 deg.C. Dimension of the conservator shall be indicated on the General Arrangement Drawing.
- b) Oil level indicator shall be provided on the side which will be with fully covered detachable flange with single gasket and tightened with GI nut-bolt.
- c) The inside diameter of the pipe connecting the conservator to the main tank shall be within 20 to 50mm and it should be project into the conservator in such way that its end is approximately 20mm above the bottom of the conservator so as to create a sump for collection of impurities. The minimum oil level (corresponding to (-) 5 deg.) should be above the sump level.
- d) The pipe from conservator tank connecting to main tank shall be minimum 32 mm (min.) dia and shall have a slopping flap so that the oil falling from the pipe shall not fall directly on the active job and shall fall on the side walls only.
- e) The conservator shall be provided with the drain plug and a filling hole (30 mm dia) with cover.
- f) Pressure release Device: Explosion vent as pressure release device shall be mounted on the top of the cover of the transformer. MS pipe of 80 mm dia shall be used for the same. Suitable diaphragm shall be used for releasing of pressure.

6.10 Breather :

Breather joints will be screwed type. It shall have die-cast aluminum body or of Poly propylene materials and inside container for silica gel shall be of tin sheet, in case of aluminum die cast breather. Makes of the breather shall be subject to purchaser's approval. Volume of breathers shall be suitable for 250 gm. Of silica gel. The make and design of breather shall be subject to approval of purchaser.

6.11 Terminals :

Brass terminal stud of suitable size to carry 250 AMP for HT with necessary nuts, check-nuts and plain thick tinned washer. Each HT bushing shall be provided with a bi-metallic terminal connector to receive 25-100 sq mm AAAC. Brass terminal stud of suitable size to carry 630 A for 315 KVA & 1000 AMP for 500 KVA for LT with necessary nuts, check-nuts and plain thick tinned washer & extended terminal plate (palm connector) to accommodate 3 no of cables to evacuate power.

6.12 Bushings & Connections :

6.12.1 For 11 KV class 12KV bushing, shall be used and for 433 volts 1.1 KV bushing shall be used. Bushings of the same voltage class shall be interchangeable. Bushings with plain shed shall be as per relevant IS: 3347 amended up to date. HV bushings shall not be mounted on the top of the transformer tank & LV bushings shall be mounted outside of the transformer tank.

6.12.2 HV bushings shall be mounted on curvature shaped embossed plate, in such a way that all H.V. Bushings shall remain parallel and at equal-distance throughout. Bushings having type tested, as per relevant IS amended up to date shall only be acceptable. Bushings on top computer shall not be acceptable.

6.12.3 The minimum creep age distance for both HV & LV Bushings shall not be less than 25mm per KV.

6.13 Internal Connections :

6.13.1 H.V. Winding:

- i. In case of HV winding all jumpers from winding to bushing shall have cross section larger than winding conductor.
- ii. Inter coil connection shall be by crimping and brazing.
- iii. Lead from delta joint shall be connected to bushing rod by brazing only. The current density in Delta lead shall be less than 2.5 A/mm²

6.13.2 L.V. Winding :

- i. L.T. Star point shall be formed of Aluminum/Copper flat of sufficient length & size. Lead from winding shall be connected to the flat by crimping and brazing.
- ii. Firm connections of L.T. winding to bushing shall be made of adequate size of 'L' shaped flat. Connection of L.T. Coil lead to 'L' shape flat shall be by crimping and brazing. Alternatively 'L' shape lug of adequate capacity effectively crimped shall be acceptable.
- iii. 'L' shape flat/lug shall be clamped to L.V. Bushing metal part by using nut, lock-nut and washers.
- iv. For Aluminum windings, L&T Alkapee aluminum brazing rods with suitable flux shall be used. For copper winding crimping and silver brazing alloy shall be used.

6.14 **Tank base channel:** It should be of two numbers of 75mm x 40mm channel for 100 KVA transformers.

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6.15 Terminal Marking Plates and Rating Plates:

Terminals shall be provided with terminal marketing plates. The transformer shall be provided with riveted rating plate of minimum 8 SWG aluminum anodized material sheet in a visible position. The entries of the rating plate shall be in indelibly marked (i.e. by etching, engraving or stamping) as NESCO/WESCO/SOUTHCO and 'Sr. No.' of transformer shall be engraved on transformer main tank below L.T. bushings.

The name of the company, order No., capacity, month and year of manufacturing shall be engraved on separate plate which shall be firmly welded to main tank and shall form integral part of the tank.

6.16. Fittings:

The fittings on the transformers shall be as under:

| | | |
|-----|---|--|
| 1 | Rating and diagram plate | 1no. |
| 2. | Earthing terminals with lugs | 2 no. |
| 3. | Lifting lugs | 4 no for main tank & 2 nos for Top cover. |
| 4. | Oil filling hole with cap (on conservator) | 1 no. |
| 5. | Drain valve – 20mm for all T/Fs | 1no. |
| 6. | Conservator with drain plug. | 1 no. |
| 7. | Thermometer pocket | 1 no. |
| 8. | Explosion vent | 1 no. |
| 9. | Silica gel breather | 1no. |
| 10. | Platform mounting channel | 2 no. |
| 11. | Oil level gauge indicating 3 positions of oil marked as below : | 1 no. |
| | Minimum (-) 5 ^o C. | |
| | Normal 30 ^o C | |
| | Maximum 98 ^o C | |
| 12. | HT & LT bushing | 3 nos of HT bushing with bimetallic connectors. Each bushing (HV & LV) should be provided with 3 nos. of brass nuts and 2 plain brass washers. LV Bushing should be provided with palm connector for evacuation of power through 2-3 cables. |
| 13 | Radiators | As per specification. |
| 14. | Lightening Arrestors for HT bushings | 1 set (3 nos) |
| 15. | Pulling lugs | 4 nos. |
| 16. | Metallic cover spot welded to tank for drain valve shall be provided. | |

6.17. Lightening Arrestors :

High surge capacity of 9 KV (Vrms), 5 KA (8/20 micro wave shape) Lightening Arrestor for 11 KV transformers conforming to IS : 3070/1974 shall be mounted on the transformers, clamped securely to the tank, to protect the transformer and associated line equipment from the occasional high voltage surges resulting from lighting or switching operations. The earthing terminal of the lightening arrestors shall be connected solidly to the transformer tank earthing in terminal. The bidder shall have to submit details such as make, type test reports and other technical details of Lighting Arrestors along with the technical bid.

6.18 Transformer Oil

Transformer oil to be used in all the Distribution transformers shall comply with the requirements of latest IS 335/1983 amended up to date thereof. In addition the oil should conform to 'Ageing Characteristics' specified below for New Oil and Oil in Transformers. Type test certificates of oil being used shall be produced to at the time of stage inspection.

New Oil-Ageing characteristics after accelerated ageing test 96 hrs. at 115 °C (open beaker method with copper catalyst):

- (i). Specific Resistance (Resistivity).
 - a) at 20° C :- 2.5×10^{12} Ohm-Cm (Min)
 - b) at 90°C :- 0.2×10^{12} Ohm-Cm (Min)
- (ii). Dielectric dissipation factor – 0.20 (Max. tandelta) 1t 90°C.
- (iii). Total acidity mg/KOH/gm-0.05 (Max.)
- (iv). Total sludge value (%) by weight – 0.05 (Max.)
- (v). The method of testing these aging characteristics is given in Appendix – C of IS 335 amended up to date.
- (vi). Oil filled in Transformers :

The important characteristics of the transformer oil after it is filled in the transformer (within 3 months of filling) shall be as follows:-

| Sr. No. | Characteristics | Specifications |
|---------|---|------------------------|
| 1. | Electric Strength (Breakdown voltage) | 30 kV (Min) |
| 2. | Dielectric dissipation factor (Tan Delta) at 90 deg.C.) | 0.01 (Max) |
| 3. | Specific Resistance (Resistivity) at 27 deg. C (ohm-cm) | 10×10^{12} |
| 4. | Flash Point, P.M. (Closed) | 140° C (Min) |
| 5. | Inter facial tension at 27°C | 0.03 N/M (Min) |
| 6. | Neutralization value (total acidity) | 0.05 Mg. KOH/gm (Max.) |
| 7 | Water content PPM | 35 (Max.) |

7.0 Test and Inspection :-

7.1 Testing facility

The bidder should have adequate testing facility for all routine and acceptance tests and also arrangement for measurement of losses, resistance, etc. details of which will be enumerated in the tender.

The inspector of the purchaser will witness routine & type tests. In order to facilitate this, the manufacturer shall give a 15 days notice that the material is ready for inspection & testing. The material shall be dispatched only after approval of such test reports and issue of Dispatch clearances by the purchaser. However the purchaser reserves the right to retest the transformers after delivery at any National Accredited Testing Laboratory in case of any disputes regarding guaranteed specifications of supplied transformers at a later date during guarantee period. The cost of such retesting shall be borne by the supplier.

7.2 Routine Tests :-

- 7.2.1 All transformers shall be subjected to the following routine tests at the manufacturer's works. The tests are to be carried out in accordance with the details specified in IS 2026 or as agreed upon between the purchaser and the manufacturer.

- i) Measurement of winding resistance.
- j) Ratio, polarity and phase relationship.
- k) Impedance voltage.
- l) Load losses.
- m) No-load losses and No-load current.
- n) Insulation resistance.
- o) Induced over voltage withstand.
- p) Separate source voltages withstand.

7.2.2 All the routine tests shall be conducted in the suppliers' laboratory at their cost.

7.2.3 Heat run test shall be arranged free of cost on the unit selected from the 1st lot by Authorized Representative.

7.2.4 The calculations to confirm the thermal ability as per Clause no. 9.1 of latest IS: 2026 Part-I or equivalent International Standard shall be submitted to our representative.

7.3 Type Tests :

The bidder should submit the report of following tests carried out in a NABL accredited laboratory :-

- d) Temperature Rise Test
- e) Short Circuit Test containing the measured no load loss and load loss.
- f) Impulse Test

The balance type tests as stated below, should be carried at the manufacturer's works invariably in the presence of representative of the purchaser at the time of inspection from the first lot.

- iv. Temperature Rise Test.
- v. Air pressure test as per clause no.22.5 of IS:1180 (Part-I)/1989.
- vi. Unbalanced current test.

In respect of the successful bidder, the purchaser reserves the right to demand repetition of some or all the above tests in presence of the purchaser's representative. In case the unit fails in the type tests or routine tests, the complete lot offered shall be rejected.

7.4 Submission Routine Test Certificate

The successful bidder shall submit the routine test certificate along with documentary evidence for having paid the Excise Duty for the following raw materials viz. Oil, Aluminum, copper for conductors, insulating materials, core materials, bushings at the time of routine testing of the fully assembled transformer.

7.5 Stage Inspection

7.5.1 Supplier shall give 15 days' advance intimation to the purchase dept. to organize stage inspection in which assembly of core, windings and other core materials etc. would be inspected. In respect of raw materials such as core stamping, winding conductor, oil etc. successful bidder shall use these materials manufactured/supplied by the standard manufacturers and furnish the manufacturer's test certificates, as well as, proof of purchase from those manufacturers documentary evidence for having paid the excise duty for the information of the department. Purchaser will depute his representative at the time of stage inspection.

7.5.2 A minimum of 10% of the transformers from the offered lot will be tested for acceptance tests at factory, in the presence of purchaser's representative before dispatch.

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7.5.3 The inspection may be carried out by the purchaser at any stage of manufacture. The successful bidder shall grant free access to the purchaser's representatives at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by the purchaser shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications and shall not prevent subsequent rejection if the equipment is found to be defective.

7.5.4 The purchaser may at its option, open a transformer supplied to the Stores, in presence of supplier at site or at Stores. If any of the technical particulars are seen to be in variance than the guaranteed technical particulars, the whole lot of transformer will be rejected without any liability on purchaser.

7.5.5 Testing of all Distribution Transformers for no load and full load losses.

After inspection of new transformers at factory for acceptance of the lot, all distribution transformers from the lot will be tested for no load and full load losses at all stores. Bidder has the liberty to be present at the time of testing.

7.5.6 Inspection & testing of Transformer Oil :

The bidder shall make arrangements for testing of transformer oil to be used in the transformers testing will be done in presence of purchaser's representative.

To ascertain quality of transformer oil, original manufacturer's test report should be furnished to (Testing) at the time of factory inspection for acceptance of the lot.

7.6 Rejection :-

Apart from rejection due to failure of the transformer to meet the specified test requirements the transformer shall be liable for rejection on any one of the following reasons.

- (i). Losses exceed the specified values mentioned in specification.
- (ii). Impedance voltage value exceeds the guaranteed value plus tolerances as per specification.
- (iii). Type test are not carried out as per the specification.
- (iv). Drawings are not submitted as per the specification.
- (v). GTP not submitted as per the specification.
- (vi). Heat dissipation calculation sheet are not submitted as per the specification.

7.7 Quality Assurance

a) The bidder shall invariably furnish Test certificates and information as following along with the offer failing to which the offer will be rejected.

- (i). Aluminium and copper conductor.
- (ii). Transformer oil.
- (iii). Core
- (iv). Insulating paper
- (v). Porcelain Bushings
- (vi). Steel Plate used for Tank.
- (vii). List of testing & measuring equipments indicating the make, type, year of manufacture, Last date of Calibration, Name of the agency carried out the calibration etc. Purchaser reserves the right to visit the works of manufacturer to ensure the available testing facility prior to placement of order.

b) Names of the supplier for the raw materials, list of standard accordingly to which the raw materials are tested, list of test normally carried out on raw materials in presence of bidder's representatives, copies of type test certificates.

c) Information and copies of test certificate as in (i) above respect of bought out accessories including terminal connectors.

- d) List of manufacturing facilities available. In this list the bidder shall specifically mention whether lapping machine, vacuum drying plant, air conditioned dust free room with positive air pressure for provision of provision of insulation and winding etc. are available with him.
- e) Level of automation achieved and list of areas where manual processing still exists.
- f) List of areas in manufacturing process where stage inspection are normally carried out for quality control and details of such tests and inspections.
- g) Special features provided in the equipments to make it maintenance free.
- h) List of testing equipment available with the bidder for final testing of transformers and test plant limitation, if any, vis-à-vis the type, special acceptance and routine tests specified in the relevant standards and the present specification.

7.8 Drawings :-

A set of following drawings with all dimensions shall be submitted by the Bidder along with the offer :

- a) General Dimensional drawing.
- b) Core Assembly drawing.
- c) Internal Construction Drawing.
- d) Rating & Diagram Plate Drawing.
- e) HV/LV Bushings indicating measurement of creep age distances.
- f) Operation and Maintenance Manual.

The drawings shall be of A-3 (420x297mm) size only. The bidder should also supply along with his offer the pamplete/ literatures etc. for fittings/accessories.

The bidder should not change design once offered as per A/T, Approved drawings and Type Test Reports.

The successful Bidders shall submit complete set of Drawings of transformer in triplicate indicating dimensions for approval and get approved it before offering 1st stage inspection.

7.9 Performance Guarantee:

All transformers supplied against this specification shall be guaranteed for a period of 30 months from the date of receipt at the consignee's Stores Center or 24 months from the date of commissioning, whichever is earlier. However, any engineering error, omission, working provisions, etc. which do not have any effect on the time period, shall be attended to as and when observed / pointed out without any price implication.

8. COST DATA SHEET:-

The bidders shall submit the cost data sheets indicating the break up prices and quantity of each raw material and components along with the unit rates required for manufacture the offered transformers along with the offer. The cost data sheet format is enclosed herewith. If the rates quoted are not justified with the cost data sheets, the offer shall not be considered for evaluation and placement of the order.

9. NON COMPLIANCE SCHEDULE

On this schedule the bidder shall provide a list of non compliance with this specification, documenting the effects that such non compliance is likely to have on the equipment's life and operating characteristics. Each Non Compliance shall refer to the relevant clause of the specification.

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Where there are no deviations from specifications, the bidder shall so indicate by stating "No deviations" in this schedule.

| Clause No. | Non Compliance |
|------------|----------------|
| | |

10.0 Type Test Certificates Schedule

10.1 On this schedule a list of the test certificates included with the bid shall be provided. Each certificate listed shall be referred to the relevant specification clause and item of equipment to which the test applies.

| Sl. No. | Particular of Test | Type Test Certificate Ref | Year of Test |
|---------|--------------------|---------------------------|--------------|
| | | | |

10.2 In case of any doubt in the Type test reports submitted by the bidder, the Purchaser reserves the right to verify the original Type Test Reports, as well as to refer to the concerned laboratory directly without recourse to be bidder.

11.0 CAPITALISATION OF LOSSES AND LIQUIDATED DAMAGES FOR EXCESSIVE LOSSES

11.1 LOSSES:

Transformer with lower losses shall be preferred. The bidder shall indicate the values of load and no load losses of the transformer in his bid.

11.2 CAPITALIZATION OF LOSSES

For total cost evaluation, the capitalized cost of losses will be taken into account as per the following:

Capitalized Cost of Transformer = Cost of Transformer (as per Bid) + $A \times W_i + B \times W_e$

c. Where W_i = No Load losses in KW & A = Rs. 1,52,847.00 for no load losses.

d. W_e = Load losses in KW & B = Rs. 20,175.00 for load losses.

The no load loss in KW at rated voltage & frequency and the load loss in KW at rated current, rated frequency, rated output and at 75° C shall be quoted and these figures shall be guaranteed.

11.3 LIQUIDATED DAMAGE

Liquidated damages for non-performance of transformers shall be recovered from the supplier in case he is unable to achieve the quoted guaranteed loss figures at the rate equivalent to the double of the rate considered for evaluation i.e. at the following rates:

c) For each KW of excess in no load losses: Rs. 3,05,694.00

d) For each KW of excess in load losses: Rs. 40,350.00

However, the Purchaser reserves the right to reject the transformer outrightly, if any of the losses, i.e. no load loss or load loss or both exceed(s) the specified maximum permissible loss as mentioned in the technical specification.

VOLUME- II

(Sample Forms)

2007-2008

(Tender Notification: CSO/03/Distribution Transformer)

Date: 29.02.2008

BID FORM

DESIGN & SUPPLY OF DISTRIBUTION TRANSFORMER TO WESCO/ NESCO/ SOUTHCO

To

**Central Services Office
(NESCO, WESCO & SOUTHCO)
Plot No. 123, Sector – A, Zone – A
Mancheswar Industrial Estate
Bhubaneswar – 751 010**

Sir,

1. We understand that NESCO/WESCO/SOUTHCO are desirous of procuring Distribution Transformers under 'O & M' in their respective licensed distribution network area in the state of Orissa.
2. Having examined the Bidding Documents for the above named works, we the undersigned, offer to deliver the goods in full conformity with the Drawings, Conditions of Contract and specifications for the sum of..... (figures.....) or such other sums as may be determined in accordance with the terms and conditions of the contract. The above amounts are in accordance with the Price Schedules attached herewith and are made part of this bid.
3. If our Bid is accepted, we undertake to deliver the entire goods within 60 days (2 months) from the date of award of purchase order/letter of intent.
4. If our Bid is accepted, we will furnish a performance bank guarantee for an amount of 10% (Ten) percent of the total contract value for due performance of the Contract in accordance with the General Conditions of Contract.
5. We agree to abide by this Bid for a period of 90 days from the date fixed for bid opening under clause 9.0 of GCC, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
6. We declare that we have studied the provision of Indian Income Tax Law and other Indian Laws for supply of equipments/materials and the prices have been quoted accordingly.
7. Unless and until Letter of Intent is issued, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.
8. We understand that you are not bound to accept the lowest, or any bid you may receive.
9. There is provision for Resolution of Disputes under this Contract, in accordance with the Laws and Jurisdiction of Contract, Clause 19 of GCC.

Dated this..... day of..... 20

Signature..... In the capacity of

.....duly authorized to sign for and on behalf of
(IN BLOCK CAPITALS)

FORMAT FOR BID SECURITY BANK GUARANTEE

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

Whereas [name of the Bidder] (hereinafter called "the Bidder") has submitted its bid dated [date of submission of bid] for the supply of [name and/or description of the goods] (hereafter called "the Bid").

KNOW ALL PEOPLE by these presents that WE [name of bank] at [Branch name and address], having our registered office at [address of the registered office of the bank] (hereinafter called "the Bank"), are bound unto North Eastern Electricity Company of Orissa Ltd., with it's Registered Office at Plot 123, Sector A, Zone A, Mancheswar Industrial Estate, Bhubaneswar – 751 010, (hereinafter called "the Purchaser") in the sum of Rsfor which payment well and truly to be made to the said Purchaser, the Bank binds itself, its successors, and assigns by these presents. Sealed with the Common Seal of the said Bank this ____ day of _____ 20____.

THE CONDITIONS of this obligation are:

1. If the Bidder withdraws its Bid during the period of bid validity specified by the Bidder on the Bid Form; or
2. If the Bidder, having been notified of the acceptance of its Bid by the Purchaser during the period of bid validity:
 - (a) fails or refuses to execute the Contract Form, if required; or
 - (b) fails or refuses to furnish the performance security, in accordance with the Instructions to Bidders/ GENERAL CONDITIONS.;

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

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

(signature of the bank)

Signature of the witness

Registered Office of NESCO, WESCO & SOUTHCO

PROFORMA FOR BANK GUARANTEE FOR CONTRACT PERFORMANCE

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

Bank Guarantee No.....
Date.....
Ref.

To

NESCO/ WESCO /SOUTHCO (As the case may be)
Registered Office at :
Plot No. 123, Sector – A, Zone – A
Mancheswar Industrial Estate
Bhubaneswar – 751 010

Dear Sirs,

In consideration of the (WESCO/NESCO/SOUTHCO) here in after termed as "Purchaser" having awarded to M/s. with its Registered Office/Head Office at..... (hereinafter referred to as the 'Contractor' which expression shall unless repugnant to the context meaning thereof, include its successors administrators, executors and assigns), a Contract by issue of Letter of Award No.dated.....and the same having been acknowledged by the Contractor, resulting in a Contract bearing No. dated.....valued at.....for.....and the Contractor having agreed to provide a Contract Performance Guarantee for the faithful performance of the entire Contract equivalent to *.....% (.....percent) of the said value of the Contract to the Purchaser.

We.....(Name & Address) having its Registered Office at..... hereinafter referred to as the 'Bank', which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns) do hereby Guarantee and undertake to pay the Purchaser, on demand any and all monies payable by the Contractor to the extent of.....**.....as aforesaid at any time upto(days/month/year) without any demur, reservation, contest, recourse or protest and/or without any reference to the Supplier. Any such demand made by the Purchaser on the Bank shall be conclusive and binding notwithstanding any difference between the Purchaser and the Contractor or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. The Bank undertakes not to revoke this Guarantee during its currency without previous consent of the Purchaser and further agrees that the Guarantee herein contained shall continue to be enforceable till the Purchaser discharges this Guarantee.

The Purchaser shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee, from time to time to extend the time for performance of the Contract by the Contractor. The Purchaser shall have the fullest liberty, without affecting this Guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Contractor, and to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied, in the Contract between the Purchaser and the Contractor or any other course or remedy or security available to the Purchaser. The Bank shall not to be released of its obligations under these presents by any exercise by the Purchaser of its liberty with reference to the matters aforesaid or any of them or by reason of any other act of

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forbearance or other acts of omission or commission on the part of the Purchaser or any other indulgences shown by the Purchaser or by any other matter or thing whatsoever which under law would, but for this provision have the effect of relieving the Bank.

The Bank also agrees that the Purchaser at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against Supplier and notwithstanding any security or other Guarantee the Purchaser may have in relation to the Contractor's liabilities.

Notwithstanding anything contained hereinabove our liability under this Guarantee is restricted toand it shall remain in force upto and including and shall be extended from time to time for such period (not exceeding one year),as may be desired by M/s..... on whose behalf this Guarantee has been given.

Dated this..... day of 20..... at.....

WITNESS

(Signature)..... (Signature).....

(Name)..... (Name).....

..... (Official Address)

(Designation with Bank Stamp)

Attorney as per Power of Attorney No.....

Dated.....

NOTE:

1. *This sum shall be Ten percent (10%) of the Contract price.

**The date will be ninety (90) days after the end of Warranty Period as specified in the Contract.
2. The stamp papers of appropriate value shall be purchased in the name of issuing bank.
3. Performance security is to be provided by the successful bidder in the form of a bank guarantee, which should be issued by any Scheduled Bank.

| FORMAT FOR COST DATA | | | | | |
|----------------------|------------------------------|----------|------------------|-------|----------|
| ITEM DESCRIPTION | | | | | |
| Sr. No. | PARTICULARS | UNIT | UNIT RATES (RS.) | QTY. | AMT (Rs) |
| 1. | CORE (M4 or better) | KG | | | |
| 2. | ALLUMINIUM / COPPER WITH DPC | KG | | | |
| 3 | INSULATION PAPER | Meter | | | |
| 4. | OIL | LTRS | | | |
| 5. | TANK | Kg | | | |
| 6. | CHANNELS | KG | | | |
| 7 | INSULATORS / BUHIUNGS | NO | | | |
| 8 | Radiators | No | | | |
| 9 | OTHERS | LUMP SUM | | | |
| | | | | TOTAL | |
| | WASTAGE @% | | | | |

**GUARANTEED & OTHER TECHNICAL PARTICULARS FOR DISTRIBUTION TRANSFORMERS
(To be furnished by the Manufacturer)**

Table : A

| Sl. No. | Description | 100 KVA | 315 KVA | 500 KVA |
|---------|---|---------|---------|---------|
| 1. | Make & Manufacturer | | | |
| 2. | Place of Manufacturer | | | |
| 3. | Voltage Ratio | | | |
| 4. | Rating in KVA | | | |
| 5. | Full load current | | | |
| | HV : | | | |
| | LV : | | | |
| 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. | Magnetizing (No load) Current at | | | |
| | a) Normal Voltage | | | |
| | b) Maximum Voltage | | | |
| 9. | Losses (should be in line with the Type Test report to be submitted along with the technical bid) in watts at 75° C | | | |
| | a) No Load loss at rated voltage & frequency | | | |
| | b) Full load loss at rated current and principal tap | | | |
| 10. | Resistance of Windings at 20 Deg. C (With 5% tolerance) | | | |
| | a) HV Winding (Ohms) | | | |
| | b) LV Winding (ohms) | | | |
| 11. | Total losses in watts at 75° C | | | |
| 12. | Current density used for | | | |
| | a) HV Winding | | | |
| | b) LV Winding | | | |
| 13. | Clearances (in mm) | | | |
| | a) Core & LV | | | |
| | b) LV & HV | | | |
| | c) HV Phase to Phase | | | |
| | d) End insulation clearance to Earth | | | |
| | e) Any Point of winding to tank | | | |
| | f) Between HV Coils | | | |

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| | | | | |
|-----|---|--|--|--|
| 14. | % Impedance at 75 C | | | |
| 15. | Radiation : | | | |
| | a) Heat dissipation by tank walls exclusive top & bottom | | | |
| | b) Heat dissipation by cooling tube | | | |
| | c) Dia & thickness of cooling tube | | | |
| | d) 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. | | | |
| 16. | Inter layer insulation provided in design for | | | |
| | 1) Top & bottom layer | | | |
| | 2) In between all layer | | | |
| | 3) Details of end insulation | | | |
| | 4) Whether wedges are provided at 50% turns of the HV coil | | | |
| | 5) No of wedges provided | | | |
| 17. | Insulation materials provided | | | |
| | a) For Conductors (1) HV (2) LV | | | |
| | b) For Core | | | |
| 18. | Whether the offer conforms to the limits of impedance mentioned in the specification | | | |
| 19. | Whether the offer conforms to the limits of temperature rise mentioned in the specification. | | | |
| 20. | Whether the losses of the transformer offered are offered are within the limits specified | | | |
| 21. | Whether the transformer offered is already type tested for the rating and test reports enclosed. | | | |
| 22. | Whether the HV Bushings and LV Bushings offered are already type tested and test reports (Manufacture's test reports if it is a bought out item) enclosed. | | | |

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TABLE - B

| Sl. No. | Description | 100 KVA | 315 KVA | 500 KVA |
|---------|--|---------|---------|---------|
| 1. | Voltage Ratio | | | |
| 2 | Rating in KVA | | | |
| 3. | Full load current | | | |
| 4.. | Efficiency at 75 Deg. C. | | | |
| | a) Unity P.F. & | | | |
| | b) 0.8 P.F. | | | |
| | 1) 125% load | | | |
| | 2) 100% load | | | |
| | 3) 75% load | | | |
| | 4) 50% load | | | |
| | 5) 25% load | | | |
| | b) Max. efficiency | | | |
| 5. | Regulation at | | | |
| | a) Unity P.F. | | | |
| | b) 0.8 P.F. at Deg. C | | | |
| 6. | Flash Test | | | |
| | HV 28KV / 50 Hz for 1 minute | | | |
| | LV 3 KV / 50 Hz for 1 minute | | | |
| 7. | Over potential Test Double Voltage & Double frequency for 1 minute | | | |
| 8. | Impulse Test | | | |
| 9. | Weight Content of | | | |
| | a) Core lamination (min.) | | | |
| | b) Windings (min.) | | | |
| | c) Tank & Fittings | | | |
| | d) Oil | | | |
| | e) Oil Qty. (min.) | | | |
| | f) Total Weight | | | |
| 10. | Oil Data | | | |
| | 1. Qty. for first filling (min.) | | | |
| | 2. Grade of oil used | | | |
| | 3. Maker's name | | | |
| | 4. BDV at the time of filling | | | |
| 11. | Transformer : | | | |
| | 1) Overall length x breadth x height | | | |
| | 2) Tank length x breadth x height | | | |
| | 3) Thickness of plates for | | | |
| | a) Side Plate (min) | | | |
| | b) Top & Bottom Plate (min.) | | | |
| 12. | Size of the wire used | | | |
| | 1) HV a) SWG / min | | | |

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| | | | | |
|-----|--|----------------|--|--|
| | b) Dia | | | |
| | c) Area (Sq. mm) | | | |
| | 2) LV a) Strip Size | | | |
| | b) No. of Conductors in parallel | | | |
| | c) Total area of cross section (sq.mm) | | | |
| 13. | Is the name plate gives all particulars are required in Tender | | | |
| 14. | Particulars of Bushings HV / LV | | | |
| | 1) Maker's Name | | | |
| | 2) Type IS – 3347/IS-1180 | | | |
| | 3) Rating as per I.S. | | | |
| | 4) Dry Flash over voltage KV at 50 C/s. | | | |
| | 5) Wet Flash over voltage KV at 50 C/S | | | |
| 15. | Details of tapping provided on HV side | Not Applicable | | |

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TABLE - C

| Sl. No | Description | Unit | 100 KVA | 315 KVA | 500 KVA |
|--------|--|------------|---------|---------|---------|
| 1 | Core Grade | | | | |
| 2 | Core diameter | mm | | | |
| 3 | Gross Core area | cm | | | |
| 4 | Net Core area | cm | | | |
| 5 | Flux density | Tesla | | | |
| 6 | Wt. Core | kg. | | | |
| 7 | Loss per Kg. Of core at the specified Flux Density | watts | | | |
| 8 | Core window height | mm | | | |
| 9 | Centre to center distance of the core | mm | | | |
| 10 | No. of LV Turns | mm | | | |
| 11 | No. of HV Turns | mm | | | |
| 12 | Size of LV Conductor bare / covered | mm | | | |
| 13 | Size of HV Conductor bare / covered | mm | | | |
| 14 | No. of Parallels | | | | |
| 15 | Current density of LV winding | amps/sq.mm | | | |
| 16 | Current density of HV winding | amps/sq.mm | | | |
| 17 | Wt. of the LV winding for Transformers | kg. | | | |
| 18 | Wt. of the HV winding for 1 Transformers | kg. | | | |
| 19 | No. of LV coils / phase | | | | |
| 20 | No. of HV coils / phase | | | | |
| 21 | Height of LV winding | mm | | | |
| | Height of HV Winding | mm | | | |
| 22 | ID / OD of LV winding | mm | | | |
| 23 | ID / OD of LV winding | mm | | | |
| 24 | Size of the duct in LV winding | mm | | | |
| 25 | Size of the duct in HV winding | mm | | | |
| 26 | Size of the duct between HV & LV | mm | | | |
| 27 | HV winding of LV clearance | mm | | | |
| 28 | LV winding to tank clearance | mm | | | |
| 29 | Calculated impedance | mm | | | |
| 30 | Calculated impedance | % | | | |
| 31 | HV to earth creepage distance | mm | | | |
| 32 | LV to earth creepage distance | mm | | | |
| 33 | LV to earth creepage distance | mm | | | |
| 34 | Winding Material | | | | |
| 35 | HV | | | | |
| 36 | LV | | | | |

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TABLE – D

SOURCE OF MATERIALS / PLACES OF MANUFACTURE, TESTING AND INSPECTION

| Sl. No. | Item | Source of Material | Place of Manufacture | Place of testing and inspection |
|---------|---|--------------------|----------------------|---------------------------------|
| 1. | Laminations | | | |
| 2. | Aluminum / Copper | | | |
| 3. | Core plates | | | |
| 4. | Steel Castings / Sections | | | |
| 5. | Tank | | | |
| 6. | Insulating Cylinders | | | |
| 7. | Bushing HV / LV | | | |
| 8. | Oil | | | |
| 9. | Insulated winding wire | | | |
| 10. | a) Tap Changer. b) Pressure relief vent. | | | |
| | | | | |

PAST PERFORMANCE DETAILS

| Capacity of Transformer | FY | Name/Address of the Costumer | Order Ref | Order Qty | Supply Qty | Date of Supply | Performance Certificate Ref |
|-------------------------|---------|------------------------------|-----------|-----------|------------|----------------|-----------------------------|
| 5 MVA | 2002-03 | | | | | | |
| | 2003-04 | | | | | | |
| | 2004-05 | | | | | | |
| | 2005-06 | | | | | | |
| | 2006-07 | | | | | | |
| 8 MVA | 2002-03 | | | | | | |
| | 2003-04 | | | | | | |
| | 2004-05 | | | | | | |
| | 2005-06 | | | | | | |
| | 2006-07 | | | | | | |

- Note :
- 1) Copies of necessary documents in support of above details needs to be submitted along with the bid.
 - 2) The Purchaser reserves the right to make correspondence with the costumers regarding confirmation of any/all of the above facts.