

By Regd. Post with Ack. Due.



NORTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LTD
WARANGAL – 506 001.

(EXTENSION PURCHASE ORDER)

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From

The Chief General Manager / P&MM,
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T.S.N.P.D.C.L, Corporate Office,
Nakkalagutta, Hanamkonda,
Warangal – 506 001.

To

M/s. Toshiba Transmission & Distribution
Systems (India) Private Limited,
Rudraram, Patancheru Mandal,
Sangareddy District, Telangana.
Pin : 502329, India

GSTIN No. 36AABCN2875L321.

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P.O.No.CGM/P&MM/NPDCL/Wgl./GM/DE-2/A3/Extn.PM-5474/17,Dt.27-01-18.

Dear Sir,

Sub : TSNPDCL – P&MM Wing - Tender Specification No. STN-05/17-18 for procurement of **12 Nos.** 11KV/433–250V, 3-Phase 500 KVA Amorphous/Core Type Copper Conductor Distribution Transformers with BIS Energy Efficiency Level-3 (Star-2) **for Water Grid Works** – Extension Purchase Order - Issued–Reg.

Ref : 1. Tender specification No. STN-05/2017-18.
2. Lr.No.CGM/P&MM/NPDCL/Wgl./GM/DE-2/A3/PM-5289/17, Dt.18-08-2017.
3. Office Note approved on Dt. 24.01.2018.

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- 1. ACCEPTANCE :** I acting for and on behalf of and by the order and direction of the TSNPDCL, accept the rates for supply of 11KV/433–250V, -Phase 500 KVA Amorphous/Core Type Copper Conductor Distribution Transformers with BIS Energy Efficiency Level-3 (Star-2) with guaranteed losses as per Clause-5.0, Schedule of Material and as per the above cited correspondence subject to the following terms and conditions.
- 2. PRICES :** The prices noted are variable and free at a destination stores inclusive of Freight & Insurance, CGST@9% & SGST@9%. The unloading charges at destination stores shall be to TSNPDCL's account. The prices are variable as per IEEMA price variation formula as given below with base date as **01-06-2017** with ceiling limit of 30% on positive side and there is no limit on negative side.

$$P = \frac{P_0}{100} \left\{ 10 + 33 \frac{C}{C_0} + 24 \frac{ES}{ES_0} + 9 \frac{IS}{IS_0} + 4 \frac{IM}{IM_0} + 5 \frac{TO}{TO_0} + 15 \frac{W}{W_0} \right\}$$

The date of delivery for the purpose of price variation, shall be the date of which the Distribution Transformers is notified as being ready for inspection/despatch (in the absence of such notification, the date of manufacturers despatch note shall be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto) (or) actual date of delivery, whichever is advantageous to purchaser for supplies made beyond schedule delivery date. For material deliveries before the schedule delivery date, the prices shall be as per the IEEMA PVC Clause (on TSNPDCL request for early supplies in writing).

As far as practicable, prices will be revised (upward or downward) abinitio, to take care to any variation in price of raw materials as defined above, but if for any reason it is not found to be practicable, the deliveries shall be effected at the contracted price and price variation claimed subsequently through a supplementary bill which will be paid as per the purchase order terms after approval by this office. If any time, any documentary evidence proof or certificate in regard to the price variation bill is required by this office the supplier shall have to furnish the same.

The price variation bills shall be claimed separately which will be paid after approval of the same by this office and after adjustment of recoveries, if any, intimated by field officers. You shall claim only the prices as indicated in the purchase order in your regular bills.

If there is downward revision in the prices of materials at the time of supply, the suppliers shall invariably claim the invoices at reduced rates on account of such downward revision.

3. SCHEDULE OF MATERIALS :

Sl. No.	Description	Qty. in Nos.	FADS Rate per Unit in		Total Amount	
			Rs.	Ps.	Rs.	Ps.
1	11KV/433 – 250V 500 KVA oil immersed naturally cooled three phase, 50 Hz double wound/Amorphous Core Copper Winding, outdoor sealed type, BIS Energy Efficiency Level-3 (Star-2) Distribution Transformers top cover fixed with nut and bolt and neoprene continuous gasket arrangement generally conforming to IS-1180 (Part-1) : 2014 and IS-2026/1977 latest versions except where specified otherwise with first filling of oil generally as per IS-335/1983 (latest version) and as per specification. Guaranteed Maximum Losses Max. losses @ 50% load : 1430 W Max. losses @100% load : 4100 W	12	Ex Works	:	7,33,640.68	1,04,28,000.00
			Freight & Insurance	:	2,800.00	
			CGST@9%		66,279.66	
			SGST@9%	:	66,279.66	
			Total Cost/ per unit	:	8,69,000.00	
TOTAL		12			1,04,28,000.00	
(Rupees One Crore Four Lakhs Twenty Eight Thousand Only)						

NOTE:-

- The above transformers are guaranteed for a period of five years from the date of receipt of material at destination stores.
- 6 sets of drawings, guaranteed technical particulars, additional details and Source of materials shall be submitted within 15 days of receipt of purchase order and all other particulars mentioned in the list of fittings.
- You are requested to submit the type test reports before approval of Drawings as per GTP without effecting the delivery schedule.**

4. DELIVERY :

The delivery of the transformers shall commence and complete as shown below.

Date	Qty. in Nos.
28.02.2018	4
31.03.2018	4
31.05.2018	4
TOTAL	12

However, you are requested to advance and improve the quantity to be delivered.

The type test reports and drawings of the above and 500 KVA Three phase distribution transformers may be got approved well before commencement of supplies.

Delay in delivery of materials free at destination stores due to non-availability of transport facility and any such reasons will not be considered. It is the responsibility of the supplier to make alternate arrangements for transporting the material so as to see the materials reaches the destination within the stipulated period.

The TSNPDCL shall have the right to vary the delivery schedule mentioned in this purchase order due to any operational exigencies at any time during the execution of the order by the suppliers, after due notice.

5. LOSSES :

The total losses (includes no- load & load losses) at 50% and 100% loading equivalent to BIS Energy Efficiency Level-3 shall not exceed the values at rated voltage and rated frequency permitted at 75 Deg.C are indicated below.

KVA rating	Voltage ratio	Max. Losses @ 50% load, Watts	Max. Losses @ 100% load, Watts
500	11000/433 V	1430	4100

The above losses are maximum allowable and there would not be any positive tolerance. Firm has to supply the transformer as per no load losses, load losses and Maximum losses at 50% and 100% as mentioned in GTP.

6. PENALTY FOR EXCESSIVE LOSSES: (During Guarantee period).

During testing, if it is found that the actual measured losses are more than values quoted by the bidder, penalty shall be recovered from the bidder at double the loss capitalization formula as mentioned below.

- (a) No load losses Rs. 288.23 per watt or part there of excessive loss.
- (b) Load loss: Rs. 93.68 per watt or part there of excessive loss

For fraction of a KW, proportionate penalty will be recovered.

Transformers with temperature rise and impedance beyond guaranteed values not be accepted.

Purchaser reserves the right to reject any transformer during the test at supplier's works, if the losses, temperature rise and impedance values differ from the guaranteed values.

Purchaser also reserves the right to retain the rejected transformer and take it into service until the Bidder replaces it with a new transformer at no extra cost. The delivery as per contract will be counted when the new transformer as per specification is provided by the manufacture.

7 DESIGN & CONSTRUCTION :

7.1 CORE : Amorphous Material:

- (i) The core shall be wound type of amorphous core annealed steel lamination having low loss and good grain properties, coated with hot oil proof insulation, bolted together and to the frames firmly to prevent vibration or noise. The core shall be stress relieved by annealing under inert atmosphere if required. The complete design of core must ensure permanency of the core loss with continuous working of the transformers. The value of the maximum flux density allowed in the design and grade of lamination used shall be clearly stated in the offer.

- (ii) The transformers core shall be suitable for over fluxing (due to combined effect of voltage and frequency) up to 12.5% without injurious heating at full load conditions and shall not get saturated. The bidder shall furnish necessary design data in support of this situation **(not more than 1.6 Tesla)**.
- (iii) No-load current shall not exceed 3% of full load current and will be measured by energizing the transformer at rated voltage and frequency. Increase of 12.5% of rated voltage shall not increase the no-load current by 6% of full load current.

7.2 Windings: winding material shall be as per specification.

7.3 INSULATION MATERIAL & CLEARANCES :

- a. Materials: Electrical grade insulation epoxy dotted Kraft paper of standard make or better material subject to approval of the purchaser. Press Board of standard make or better material and subject to approval of purchaser. Inter layer insulation shall be Epoxy dotted paper.
- b. All spacers, axial wedges/runners used in windings shall be made of pre-compressed Pressboard- solid, conforming to type B 3.1 of IEC 641-3-2. All spacers shall be properly sheared and dovetail punched to ensure proper locking. All axial wedges/ runners shall be properly milled to dovetail shape so that they pass through the designed spacers freely. Insulation shearing, cutting milling and punching operations shall be carried out in such a way, that there should not be any burr and dimensional variations.

7.4 CLEARANCES : The clearances for the wound core shall be maintained as specified in the tender specification.

7.5. TANK : Circular cross section cooling tubes of not less than 38 mm dia and 1.25 mm thick bent & directly Welded to tank shall be provided. OR The radiators can be Press fin type of 1.2mm thickness to achieve the desired cooling to limit the specified temperature rise. They should be fixed at right angles to the sides and not diagonally. The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise. The size of the radiator shall be such that it covers at least 50% of the bottom yoke, full core and complete top yoke. Supplier shall submit the calculation sheet. The bidder may offer corrugated tanks for transformers of all ratings

7.5.1. The transformer tank shall be of robust construction rectangular in shape and shall be built up of tested MS sheets with tolerance applicable as per IS:1852.

- | | | | |
|------|-----------------------------|---|-------------------|
| i) | Side walls (min) | : | 4 mm thickness. |
| ii) | Top and bottom plates (min) | : | 6.0 mm thickness. |
| iii) | Bottom plates (Min.) | : | 6 mm thickness |

7.5.2. The internal clearance of tank shall be such that, it shall facilitate easy lifting of core with coils from the tank without dismantling LV bushings. The four walls of the tank shall be made of TWO "L" shaped sheets (without joints)/**ONE 'U' shaped bend sheet (without joints) and one flat sheet** fully welded at the corners from inside and outside of the tank. Two sides corner shall be welded for withstanding a pressure of 80 kPa and a vacuum of 500mm of mercury

Tanks with corrugations shall be tested for leakage test at a pressure of 0.15kg/ sq cm measured at the top of the tank.

All the tank plates shall be of such strength that the complete transformer with oil and fittings can be lifted bodily by means of lifting lugs provided.

- 7.5.3. All joints of tank and fittings shall be oil tight and no bulging should occur during service. The tank design shall be such that the core and windings can be lifted freely. The tank plate shall be of such strength that the complete transformer when filled with oil may be lifted bodily by means of lifting lugs provided. Inside of tank shall be painted with *hot oil proof paint*.
- 7.5.4. Manufacturer should carry out all welding operations as per the relevant ASME standards and submit a copy of the welding procedure qualifications and welder performance qualification certificate to the customer.
- 7.5.5. The tank shall be reinforced by welded angle (**50x50x6** mm) on all the outside wall on the edge of the tank. Permanent deflection when the tank without oil is subject to a vacuum of **500** mm of mercury shall not be more than 5 mm up to 750 mm length and **6.5** mm up to **1250** mm length. The tank shall further be capable of withstanding a pressure of **80 kPa for 30 min** without any deformation.
- 7.5.6 Pressure test will be conducted by the inspecting officer on a transformer vent pipe against each lot offered for inspection. The diaphragm should burst at a pressure between 0.76Kg./Sq.mm to 0.95Kg./Sq.mm. For any operational failure of vent pipe and consequent damaged to the tank in addition to insisting for free replacement of the tank, the TSNPDCL may at its option, recover an estimated loss sustained by it from the manufacturer.
- 7.5.7 The transformer tank top cover shall be fixed with M12/M14 bolts (hot dip galvanized/stainless steel) as per IS 1180 (Part-1) : 2014 spaced not more than 100 mm between each bolt. **2Nos. M12 anti theft stainless (bolts) fasteners/M12 Anti theft bolts shall be fixed with provision to put seals (2 mm hole on tail side) and four corner bolt nuts shall be fixed to prevent opening of the cover at site by miscreants** and suitable continuous neoprene gasket (Rectangular) to avoid leakage of Nitrogen/dry air and all the fittings including bushings in position shall be tested for leakage at a pressure of 0.7Kg./Sq.cm inside the tank for 10 minutes. The above test shall be carried out before final sealing of the transformers.
- 7.5.8. The cooling tubes shall not be provided underneath the LV bushing to avoid puncturing of the tubes due to falling down of LV lead on them. Heat Dissipation calculation shall be furnished with respect to the maximum 100% load losses specified to the corresponding BIS Energy Efficiency Level-2.
- 7.5.9. **Lifting Lugs** : 4 Nos. welded heavy duty lifting lugs of MS plate 8 mm thick suitably reinforced by vertical supporting flat welded edgewise below the lug on the side wall.
- 7.5.10 The Sealing** : The supplier shall provide seals to four corners of the distribution transformers. The space on the top of the oil shall be filled with dry air. The dry air plus oil volume inside the tank shall be such that even under extreme operating conditions, the pressure generated inside the tank does not exceed 0.406 Kg/Sq.cm positive or negative. The volume of space above oil level shall normally be not less in volume than 55% of the volume of oil. The nitrogen/dry air shall conform to commercial grade of the relevant standard.

'U' shaped pressure relief vent of 2" diameter pipe with 0.025mm copper shim sheet /0.4 mm Bakelite thick sheet as diaphragm shall be provided on the top of the cover of the tank such that the pressure released should be directed to the ground. The vent shall be provided on opposite side of the circuit breaker operating rod. The other end of the vent pipe shall be guarded with wire mesh for preventing the entry of worms and nesting. The diaphragm shall burst at a pressure of 0.76 to 0.95 kg/sq.cm.

CONSERVATOR: a) The total volume of conservator shall be such as to contain 10% quantity of the oil. Normally 3% quantity of the total oil will be contained in the conservator. Dimensions of the conservator shall be given in the general arrangement drawing.

b) Oil level indicator shall be provided on the side which shall be fixed with fully covered detachable range with single gasket and belted with MS nuts and bolts.

c) The pipes from conservator tank connecting to main tank shall have a sloping flaps so that oil falling from the pipe shall not fall directly on the active parts but on the side walls only. The pipe shall be of 25-50 mm dia and it should project atleast 20mm above the bottom of conservator.

d) The conservator shall be provided with a drain plug and a plugged filling hole.

BREATHER: Clear view design based on DIN standard 42567 Silica gel Breather housed in a transparent compartment. Approval of Board to be taken for the make of breather. Volume of breather shall be suitable for 500 gms. of Silica gel.

7.5.11 Manufacturer has to emboss his company monogram and the word "TSNPDCL" shall be embossed on the side sheet of the Tank above rating & diagram plate. The size of the embossing of the word "TSNPDCL" is of 2 Inches. The following information shall also be embossed on a separate MS sheet of thickness 2mm and firmly welded (No Tack welding) on one side of the transformer. The size of the word is of 1" inch. a) P.O. No. & Date, b) Year of manufacture c) Make and Serial No. d) 5 years Guarantee period.

7.6. **SURFACE, PREPARATION AND PAINTING** : Shall be maintained as specified in the tender specification .

7.6.1 Tests for painting.

7.6.2 The painted surface shall be tested for paint thickness.

7.6.3 The painted surface shall pass the Cross Hatch Adhesion test, Salt spray test and hardness test as per the relevant ASTM standards.

7.7. FINISHING:

The exterior of the transformer and other ferrous fittings shall be thoroughly cleaned, scraped and given a primary coat and the two finishing coats of durable oil and weather resisting paint of polyurethane. The colour of the finishing coats shall be dark admiral gray conforming to No.632 of IS 5 of 1961 colours for ready mixed paints.

7.8. BUSHINGS: Shall be maintained as specified in the tender specification.

The bushings shall conform to the relevant standards specified and shall be outdoor. The bushings shall be fixed to the transformers on sides with straight/slant pockets and in the same plane. The tests as per IS:2099/1962 shall be conducted on the transformer bushings as detailed below.

- i) Dry flashover voltage.
- ii) Wet flashover voltage.
- iii) Dry 1 min. withstand voltage.
- iv) Wet 1 min. withstand voltage.
- v) Impulse withstand voltage (1.2/50 micro sec. Positive wave).

7.9 Terminal Connectors:

The L V bushing and HV busing stems shall be provided with suitable terminal connectors so as to connect the jumper without disturbing the bushing stem. Connectors shall be with eye bolts so as to receive 55 sq.mm conductor for HV Terminal connectors must have type tested as per IS:5561.

7.10 Rating Plates:

The rating plates on the transformer containing the information specified in clause 15.2 of IS : 2026-1977 (Part-i). 50% & 100% load losses of the transformer should also be mentioned on the rating plate.

ISI Labeling: ISI label in accordance with colour design, logo etc., shall be provided on each transformer as per the design/recommendations of Bureau of Indian standards (BIS). Expenses incurred to get star rating labeling is in the account of suppliers only. The certificate of registration issued by BIS shall be submitted.

7.11 Arcing Horns:

Arcing Horns are to be provided as per relevant standard, one number per phase shall be fitted under the HV bushings with GI earth strip 25x4 mm connected to the body of the transformer with necessary clamping arrangement shall be provided.

7.12. FITTINGS : The following standard fittings shall be provided.

- a) Rating and terminal marking plates non detachable – 2 Nos.
- b) Earthing terminals with bolt, nuts & washers for connecting earth wire - 2Nos.
- c) Lifting lugs – 2 Nos. for main tank and 2Nos. for top cover
- d) Bimetallic terminal connectors on the HV/LV bushings – 7 Nos.
- e) Thermometer pocket with cap – 1 No.
- f) U shaped Pressure relief vent pipe of 2' dia with 0.0025 mm diaphragm on the tope of the top cover for breaking at a pressure of 0.76 to 0.95 Kg/cm² such that the pressure released should be directed to the ground and other end of the vent pipe shall be guarded with suitable mesh against entering of worm and resting. For corrugated tank, PRD will be provided instead of explosion vent.
- g) HV bushings – 3 Nos.
- h) LV bushings – 4 Nos.
- i) Stiffener angle 50x50x6 mm (and vertical strip of 50x5 mm flat if required).
- j) Cooling tubes – No. & lengths may be mentioned (as per heat dissipation calculations).
- k) *Arcing Horns*
- l) Base channels 125 x 65.
- m) LV epoxy bushings – 4 Nos.
- n) 5 year guarantee embossed plate with details welded below name plate.
- o) *Oil level gauge indicating three positions of oil marked as follows : Minimum 5 Deg.C, 30 Deg.C, Maximum 98 Deg.C*
- p) Tank and over all dimensions.
- q) Weight content of a) core b) windings c) tank & fittings d) weight/qty. of oil e) over all weight.

7.13. FASTENERS:

All bolts, studs, screw threads, pipe threads, bolt heads and nuts shall comply with the appropriate Indian Standards for metric threads, or the technical equivalent. Bolts or studs shall not be less than 6 mm in diameter except when used for small wiring terminals. All nuts and pins shall be adequately locked. Wherever possible bolts shall be fitted in such a manner that in the event of failure of locking resulting in the nuts working loose and falling off, the bolt will remain in position. All ferrous bolts, nuts and washers placed in outdoor positions shall be treated to prevent corrosion, by hot dip galvanizing, except high tensile steel bolts and spring washers which shall be electro-galvanized/plated. Appropriate precautions shall be taken to prevent electrolytic action between dissimilar metals. Each bolt or stud shall project at least one thread but not more than three threads through the nut, except when otherwise approved for terminal board studs or relay stems. If bolts nuts are placed so that they are inaccessible by means of ordinary spanners, special spanners shall be provided. The length of the screwed portion of the bolts shall be such that no screw thread may form part of a shear plane between members. Taper washers shall be provided where necessary.

7.14. MOUNTING ARRANGEMENT : The under base of all transformers shall be provided with two **125 x 65** channels 460 mm long with holes to make them suitable for fixing on a platform or plinth.

7.15 OVER LOAD CAPACITY: The transformers shall be suitable for loading as per relevant standard (IS 2026(Part-7)). The tendered should state clearly the percentage overload the transformers can take for a continuous period of 1 hour.

8.0. TESTS:

8.1 ACCEPTANCE & ROUTINE TESTS : All transformers shall be subjected to routine tests at the manufacturer's works. The following routine tests shall be carried out in accordance with the details specified in *REC Specification No: 23/1983*, IS: 1180 (Part-II) and IS:2026 or as agreed upon between the TSNPDCL and the manufacturer.

1. *Checking of weights, dimensions fitting and accessories, tank thickness, oil qty., material, finish and workmanship as per purchaser order and contract drawings.*
2. *Physical verification of core coil assembly and measurement of flux density of one unit of each rating, in every inspection with reference to short circuit test report.*
3. Measurement of winding resistance
4. Measurement of voltage ratio, *polarity* and check of voltage vector relationship
5. Measurement of Impedance voltage, *∓*short circuit impedance and load loss *at rated current and normal frequency.*
6. Measurement of No Load loss and current at service voltage and normal frequency.
7. *Measurement of No load current and losses at 112.5% of rated voltage.*
8. Measurement of Insulation resistance
9. Induced of over voltage with stand test
10. Separate source voltage withstand test
11. *Checking of name plate and marking on the tank.*
12. *Checking of di-electric strength of transformer oil*
13. Air pressure test : (Routine Test) : **As per IS 1180 (Part-1) : 2014**

All above acceptance and routine tests shall be carried out by the supplier in presence of purchaser's representative on 10% of quantity offered every time.

In addition to the above measurement of losses at 50% load and 100% load losses calculations at 75 Degrees for 100% transformers is to be conducted and report submitted.

Following tests shall be carried out at manufacturer's works on one unit of each rating by the supplier in presence of purchase representative.

- I. Temperature rise test.
- II. Measurement of unbalance current.
- III. Air pressure test on empty tank of transformer opened for physical verification test (Once only).
- IV. Breakdown voltage test of transformer oil.
- V. Functional test on Over-load Protection System to check the function of Over-load Protection System at full load current and at 20% overload current (or as per approved GTP).
- VI. Heat run test shall have to be conducted at suppliers cost on one transformer of each rating, from first offered lot, during the course of supplies.

To facilitate conduction of heat run test on any unit in any lot at any point of time during the supply, the manufacturer will provide a thermometer pocket which gets immersed in oil on the side of the transformer in all the transformers. The depth of the projecting stem of this pocket inside the transformer will be below oil level. It shall not fringe with electrical clearance nor obstruct the untanking of the active part.

- VII. The test certificates for all routine and type tests for the transformers and also for the bushings and transformer oil shall be submitted.
- VIII. Tests at site: The purchaser reserves the right to conduct all tests on Transformer after arrival at site and the contractor shall guarantee test certificate figures under actual service conditions.

8.2 TYPE TESTS:

The type test should have been conducted on a transformer as per the tender specification. The following Type tests shall be conducted on one transformer

1. Impulse voltage test: with chopped wave of IS 2026 part-III. BIL for 11 kV shall be of 95 KV
2. Short circuit withstand test: Thermal and dynamic ability.
3. Temperature rise test : For determining the maximum temperature rises after continuous full load run.

8.2.1 The purchase of third party shall witness the type test on randomly selected distribution transformers. The supplier shall make all arrangements for witnessing type test at his own cost.

8.3 **TOLERANCE:** Unless otherwise specified herein the test value of the transformers supplied should be within the tolerance permitted in the relevant standards. No positive tolerance is allowed on guaranteed 50% and 100% load losses.

8.4 **TESTING FACILITIES:** The supplier should have adequate testing facility and also arrange for measurement of losses, resistance etc. All test equipments shall be calibrated at NABL accredited laboratory and reports shall be within one year.

- 8.5 **INSPECTION AND TESTING OF TRANSFORMER OIL** : Shall be maintained as specified in the tender specification. To ascertain the quality of transformer oil the manufacturer's test report should be submitted at the time of inspection. Arrangements should also be made for testing the transformer oil, after taking out the samples from the manufactured transformer and tested in the presence of TSNPDCL's representative (or) if desired, in an independent laboratory.

9.0 **INSPECTION :**

The accredited representative of the TSNPDCL /accredited representative of 3rd party identified by TSNPDCL shall have access to suppliers works, at any time during working hours, for the purpose of inspecting the materials and the select samples from the materials to be offered for inspection. You shall offer the equipment to 3rd party for stage wise inspection. The contractor shall provide facilities for testing such samples at any time the supplier shall keep this office informed 15 days in advance about the manufacturing programme so that arrangements can be made for inspection. As soon as the materials are ready, you shall submit the routine test certificates. The dispatches shall be effected only if the test results comply with specification.

In the case of transformers, instrument transformers and meters, inspection will be conducted every year, for the first 2 years on a 2% sample of the quantities supplied. Samples will be collected at random to establish that the guaranteed technical parameters are as per the submitted bid by the supplier. In the case of non-adherence, the purchaser may take suitable action on the supplier including cancellation of vendor registration and banning further dealings, depending on the gravity of the deviation. These random inspections may be entrusted to a third party.

In case of materials are not of acceptance quantity or not confirming to specification, the materials will be rejected. You have to re-offer the material for inspection. In such cases the 2nd inspection charges are to your account only. In case the materials are rejected in the 2nd inspection also, the TSNPDCL reserves the right to cancel the order.

The dispatches shall be made only after inspection to the TSNPDCL's satisfaction or such inspection is waived by this office.

TSNPDCL reserves the right to insist for witnessing the acceptance/ routine tests of the bought out items.

9.1 **SEALING OF TRANSFORMERS AFTER TESTING AND INDIVIDUAL TEST REPORTS:**

After witnessing testing on sample quantity and physical inspection of all offered Transformers, the purchaser's representative will provide numbered lead/ plastic seal bits to two opposite corners of tank and inspection cover of all offered Transformers, for delivery of correct inspected materials only. The seal bit numbers against each transformer shall also be mentioned in the test reports signed by purchaser's representative submitted for delivery instructions. The transformer serial numbers and the seal bit numbers will be verified at the stores before accepting the material.

Manufacturer should submit the list of equipment for testing along with latest calibration certificates to the purchaser.

The TSNPDCL may, at its option open a Transformer supplied to stores in your presence at TSNPDCL's laboratory. If any of the guaranteed technical particulars are found to be at variance during this test the TSNPDCL reserves the right to reject the whole lot supplied.

In addition to the above, the TSNPDCL may pick up any Transformer and decide to get it type-tested at CPRI at TSNPDCL cost. The tenderer will have to organize packing etc. at TSNPDCL stores for which charges will be paid by TSNPDCL. If the Transformer fails to meet the requirements of type tests, the quantity of Transformers ordered on them will be rejected and TSNPDCL may go in for risk purchase.

10. TERMS OF PAYMENT:

100% payment along with F&I, taxes and duties will be made on or after 30 days reckoned from the date of receipt of material/equipment at destination/stores duly transferring the said amount to the bank account of the supplier by the purchaser bank. The supplier will have to predefine the Bank details while entering into contract for electronic transfer of payments. The 10% Bank Guarantee on the value of P.O. should be furnished from a Nationalized /Scheduled Bank.

NOTE:-

- i) The date of delivery would be the date on which the stores officer certifies the receipt of materials at stores in good condition i.e. Form 13, date of last consignment.
- (ii) The supplier should invariably submit test certificates as soon as despatch is made so that the test certificates can be checked up and approved well before it becomes due for payment. Routine Test Certificates of the entire lot shall be submitted to the Consignee.
- (iii) The performance Bank guarantee to be executed in accordance with this specification shall be furnished on a stamp value of Rs.100/-. The performance guarantee has to be extended suitably by you in accordance with the guarantee clause, so that the last consignment against the order is covered by the guarantee.
- (iv) The payment for materials supplied will be made by cheque on any scheduled bank at Headquarters of the Paying Officer.
- (v) If you have received any over payments by mistake or if any amounts are due to the TSNPDCL due to any other reason, when it is not possible to recover such amounts under the contract resulting out of the subject specification, the TSNPDCL reserves the right to collect the same from any other amounts and/or bank guarantee given by you due to or with the TSNPDCL.
- vi) When you do not at any time, fulfill your obligations in replacing / rectifying etc., of the damaged/ defective materials in part or whole promptly to the satisfaction of the TSNPDCL officers, the TSNPDCL reserves the right not to accept the bills against subsequent dispatches made by the supplier and only the supplier will be responsible for any demurrages, wharf ages or damages occurring to the consignment so dispatched.

11. DESPATCH :

Please arrange to supply the article specified herein and dispatch them by lorry freight prepaid to the persons and stations noted separately.

12. ACKNOWLEDGEMENT:

The Transport receipt should be sent to the persons noted against each item and should be accompanied by two copies of the invoice/challan, one of which will be returned to you direct in token of acknowledge of receipt of the goods. A copy of the invoice shall be sent to this office as soon as despatch is made.

13. LOSS OR DAMAGE :

- a. You are responsible for the safe delivery of the goods in condition at destination stores. You should acquaint yourself of the conditions obtaining for handling and transport of the goods to destination and shall include and provide for security and protective packing of the goods so as to avoid damage in transit.
- b. External damages or shortages that are prima facie the result of rough handling in transit or due to defective packing will be intimated within a fortnight of receipt of materials. Internal defects damages or shortages or any internal parts which cannot ordinarily be detected on superficial examination though due to bad handling in transit or defective packing would be intimated within 2 months from the date of receipt of the materials. In either case the damaged or defective materials should be replaced by you free of cost to TSNPDCL.
- c. If no steps are taken within 15 days of receipt of intimation of defects or such other reasonable time as the TSNPDCL may deem proper to afford, the TSNPDCL may without prejudice to its other rights and remedies causes to be repaired or rectified the defective materials or replace the same and recover the expenditure incurred therefore from the deposits such as PERFORMANCE or other monies available with the Transco or by resorting to legal action and also decline to accept further delivery of materials/equipment.
- d. Where any plant/machinery or other materials supplied by you is found to be defective in whole or in part WITHIN THE GUARANTEE PERIOD, you will be intimated of the same. You should take immediate steps to rectify the defect or to replace the defective materials free of cost within 30 days from the date of the receipt of the intimation.
- e. The defective portions or whole of the materials so replaced should give satisfactory performance till the expiry of six months from the date of such replacement or until the end of guarantee period whichever may be later.
- f. For the purpose of any legal construction, the materials should be deemed to pass into TSNPDCL's ownership only at the destination stores where they are delivered and accepted.
- g. The TSNPDCL reserves the right apart from the above said provisions, not to accept further dispatches of materials and the connected bills etc. under conditions of your continued negligence to replace any materials supplied earlier and received in damaged condition or failed within the guarantee period, or not conforming to the purchase order /specification conditions.

14. GUARANTEE :

- i) The above Distribution Transformers have been guaranteed by you for satisfactory operation for a period of **5 years** from the date of supply. The 5 years guarantee shall be embossed on a separate metal sheet, painted prominently and welded to the transformer tank just below the nameplate.
- ii) For strict implementation of this clause you may note:
 - a) On failure of a transformer, a telegraphic intimation/letter will be given to you and the transformer will be shifted to SPM Centre. You should either rectify the transformer or replace it with a good transformer within 30 days of intimation.

- b) Please note that you shall rectify/replace the defective transformer within 30-days of receipt of intimation of defects failing which payment to the extent of failed units will be deducted from the subsequent bills/banks guarantee.
- c) In case the transformer is repaired or replaced by you after 60 days of date of telegraphic intimation you should note that 5 years guarantee will be counted from the date from which the transformer is replaced and commissioned successfully by us.
- d) If the transformer is repaired or replaced beyond 3 months of date of telegraphic intimation to you, you should note that the 5 years guarantee period will be extended by the number of days by which 90 days or exceeded from the date of telegraphic intimation of failure to you.
- e) TSNPDCL reserves the right to claim the financial loss incurred suffered due to failure of Distribution Transformers during the guarantee period.

15. CHALLENGE TESTING : “The other manufacture can also request challenge testing for any test based on specification and losses. The challenger would request for testing with testing fee. The challenge test fees are proposed at least three times the cost of testing. This is likely to deter unnecessary challenges. The challenger would have the opportunity to select the sample from the store and any such challenge should be made within the guarantee period. The party challenged, and the utility could witness the challenged testing.

The challenged testing would cover the

1. Measurement of magnetizing current
2. No Load losses test.
3. Load Losses test (At 50% loading or as per acceptance test)
4. Temperature rise test.
5. Total losses at 50% and 100% loading
6. Physical verification.

The challenge test could be conducted at NABL accredited laboratory, like ERDA and CPRI. If the values are within limit the product gets confirmed else not confirmed. No positive tolerance in losses is permitted. If the product is not confirmed the manufacture would pay the challenge fee and challenger would get the fee refunded. However as redressal system the challenger would allowed to ask for fresh testing of two more samples from the store and the same be tested in NABL laboratory in presence of party challenged, challenger and the utility.

If any one or both sample does not confirm the test then the product said to have failed the test. In such cases the manufacture will be declared as unsuccessful manufacturer for the said product with wide publicity and would not be allowed to compete in tenders of the Boards for the period of three years and heavy penalty would be imposed”.

16. DEFECTIVE SUPPLIES : If, during the guaranteed period, any of the goods are found to be defective in materials or workmanship they shall be replaced by you free of cost.

17. PENALTY :

GENERAL:- The delivery of materials as per the agreed schedule of delivery is the essence of the contract and no extension of the time for delivery would be allowed except under recognized force majeure conditions.

For supplies made beyond the agreed delivery schedule, penalty shall be levied for an amount of equivalent to $\frac{1}{2}$ % of the contract value of the material not delivered within the prescribed time limit for every week of delay or part thereof subject to a maximum of 5% of cost of the undelivered portion within scheduled time.

The date of certified receipt of material at destination stores in good condition will be taken as the date of delivery. For calculation of penalty the date of receipt of material at destination stores is the "Date of Delivery" subject to the condition that, the materials is received in good condition. For penalty, the number of days would be rounded off to the nearest week and penalty calculated accordingly.

Any variation up or down in taxes or other statutory levies, or new levies introduced after placing of the order, under this specification, shall be to the TSNPDCL's account, provided that, the delivery schedules are adhered to by the supplier. In case, if there are increase in excise duty or sales tax or other statutory levies or new levies after the agreed delivery dates, the supplier shall bear the impact of these levies and if there is downward variation/revision TSNPDCL shall be given credit to that extent.

In case you do not adhere to the delivery schedule the TSNPDCL reserves the right to purchase the balance quantity from the open market and recover expenditure incurred from you. This is in addition to the right of the TSNPDCL mentioned in first para of this clause and under law.

- 18. FORCE MAJEURE:** You shall not be liable for any liquidated damages for delay or for failure to perform the contract for reasons of Force Majeure such as acts of God, acts of Public enemy, acts of Govt., fires, floods, epidemics, quarantine restrictions, strikes, lock-outs, riots freight embargoes and provided that you shall within 10 days from the beginning of such delay notify the TSNPDCL in writing of the cause of delay, the TSNPDCL shall verify the facts and grant such extension as facts justify.
- 19. EXTENTION OF TIME:** If the completion of supplies is delayed due to reason beyond the control of the supplier, the supplier shall without delay give notice to the purchaser in writing of his claim for an extension of time. The purchaser on receipt of such notice may agree to extend the contracted delivery to such date as may be reasonable but without prejudice to other terms and conditions of the contract.
- 20. DRAWINGS AND MANUALS:** the following drawings of 3 sets shall be furnished for arranging approval.
- a) Rating plate & ISI labeling
 - b) Outline diagram i.e., complete dimensional drawing showing the general arrangement, fitting details and clearances.
 - c) Core coil assembly drawing and weights of main component parts (internal construction with bill of materials).
 - d) Embossing Sheet : Supplier has to emboss his company monogram and The word "**TSNPDCL**" shall be embossed on the side sheet of the Tank above rating & diagram plate. The size of the embossing of the word "TSNPDCL" is of 2" Inches. The following information shall also be embossed on a separate MS sheet of thickness 2mm and firmly welded (No Tack welding) on one side of the transformer. The size of the word is of 1" inch. a) P.O. No. & Date, b) Year of manufacture c) Make and Serial No. d) Guarantee period.

The detailed thermal ability to withstand short circuit and temperature rise and heat dissipation calculations shall be furnished along with the drawings.

21. TEST CERTIFICATES:

The latest certificates containing the results of the tests as per IS-2026/1977 (of latest issue) must be submitted to Chief General Manager/P&MM, Corporate Office, 1ST Floor, Vidyut Bhavan, TSNPDCL, Hanumakonda, Warangal – 506 001 and got approved by him before sending bills for payment, which will not be paid unless these are approved (vide clause 8)

- a) Heat run test shall be carried out on one unit of each capacity at free of cost.
- b) TSNPDCL shall have all rights to conduct type tests at its own cost by an independent agency on a transformer either in service or from stores at its discretion. In the event of failure of transformer in such tests, the expenses incurred in testing shall be to the suppliers account. The failed unit will not be accepted for supply of TSNPDCL even after repairs.
- c) If similar transformer is tested for impulse & short circuit tests previously, copy of the same may be furnished. Otherwise impulse & short circuit tests shall be carried out on one unit free of cost and submit before drawing approval.
- d) Proof of purchase of core, transformer oil and E grade Copper/Aluminum must be furnished along with each inspection offer.

22. GUARANTEED TECHNICAL PARTICULARS: The technical particulars as per Annexure have been guaranteed by you for the supplies against this order.

23. DISPATCH INSTRUCTIONS : All the materials detailed in clause –3 must be consigned and dispatched as per dispatch instructions to be issued after inspection and the bills sent to as follows.

Sl. No.	To be sent to the TSNPDCL's stores at	Materials to be consigned and despatched to ADE/Stores/TSNPDCL	Paying officer to whom bills & RR to be sent to accounts officer/Expr. O/o. SE/Opn.
1.	Warangal	Warangal	Warangal
2.	Karimnagar	Karimnagar	Karimnagar
3.	Nizamabad	Nizamabad	Nizamabad
4.	Khammam	Khammam	Khammam
5.	Nirmal	Adilabad	Adilabad

24. PACKING :

i) The packing may be in accordance with the manufacturer's standard practice unless otherwise specified. You should however reach the departmental stores within damages after transport by Road. The packing should stand unloading and inter stores transfer with reasonable care.

ii) Whenever you dispatch materials to consignee, you should prepare the following information in the form of packing slip in quadruplicate and send the name to the consignee and obtain his acknowledge on the same. The consignee will return to you one copy of the packing slip with his remarks. The proforma of the packing slip shall be as follows.

PACKING

1. Purchase order no. and date
2. Quantity allotted to the stores and rate applicable
3. Quantity so far supplied to the stores and the rate applied
4. Quantity now supplied and the rate applied
5. Total quantity supplied under the purchase order with rates applied

iii) You shall invariably send to the purchasing office a copy of the delivery challan whenever materials are dispatched.

25. NOTE : It may be noted that

- a) The price cited are variable, FADS.
- b) GST as applicable will be paid.
- c) The ownership of the materials would rest with you till they are all received at destination in good condition.
- d) Freight charges shall be prepaid.
- e) The materials may be duly insured at your cost as per specification.
- f) **Interchangeability :** All similar materials and removable parts of similar equipment shall be interchangeable with each other .
- g) **Name Plate :** The equipment shall be marked with your trade mark SI. No. and the year of manufacture.
Tank shall be embossed with TSNPDCL. The size of the embossing of the word shall be 2 inches.
- h) ISI labeling

26. TRAINING OF TSNPDCL PERSONNEL: TSNPDCL reserves the right to depute TSNPDCL's personnel for training at your works relating to design manufacture, assembly, testing and operation and maintenance in batches. You shall provide necessary facilities during training period specified by TSNPDCL.

27. INSURANCE: The Materials/equipment supplied under the Contract will be fully insured against loss or damage incidental to manufacture or acquisition, transportation and delivery and also storage for **45 days** at destination stores **before taking into stock.**

The bidder shall a) Initiate and pursue insurance claim till settlement, and b) Promptly arrange for repair and/or replacement of any damaged items in full irrespective of settlement of insurance claim by the under Writers. c) All costs because of insurance liabilities covered under the contract will be to supplier's account. The supplier shall provide the Purchaser with a copy of all insurance policies and documents taken out by him in pursuance of the 'Contract'. Such copies of documents shall be submitted to the purchaser immediately after such insurance coverage. The supplier shall also inform the Purchaser in writing at least sixty (60) days in advance, regarding the expiry, cancellation and/or change in any of such documents and ensure revalidation/renewal etc., as may be necessary well in time.

The risks that are to be covered under the insurance shall be comprehensive and shall include but not limited to, the loss or damage in transit, storage, due to theft, pilferage, riot, civil commotion, weather conditions, accident of all kinds, fire, flood, war risk(during ocean transportation) bad or rough handling etc. The scope of such insurance shall cover the entire contract value.

The insurance will be in an amount equal to 100% FADS value of Materials/ equipment on all risks basis. The policy will have a provision for extension to cover further storage if necessary at destination stores/ site at TSNPDCL cost. **"The Insurance beneficiary shall be TSNPDCL".**

28. GENERAL :

1. Your bills in duplicate along with a copy of invoice and substantiating vouchers for all extra claims to be made separately should be forwarded to the paying officers mentioned in the dispatch instructions.
2. All General and technical correspondence should be addressed to the Chief General Manager/P&MM, Corporate Office, 1ST Floor, Vidyut Bhavan, TSNPDCL, Hanumakonda, Warangal – 506 001.

3. All Correspondence regarding bills, payment etc. should be addressed to the Paying Officers cited in the dispatch instructions with a copy to the Pay Officer, TSNPDCL , Warangal- 506 001.
4. All and any disputes or differences arising out of or touching this order shall be decided by counts or tribunals situated in Warangal. No suit or other legal proceedings shall be instituted elsewhere.
5. Unless otherwise specified, you shall abide by all the terms and conditions specified in specification.
6. Please return within a period of 15 days one copy of the purchase order duly signed in token of acceptance of all the terms and conditions of this purchase order along with the contract form executed on a Rs. 100/- Non-Judicial stamp paper.

Yours faithfully,
Sd/-
(B. ASHOK KUMAR)
CHIEF GENERAL MANAGER,
P&MM/NPDCL/WARANGAL.

We accept all the terms and Conditions of this order.

SIGNATURE OF THE CONTRACTOR

Copy Communicated to :-

The Chief General Manager/ Finance./NPDCL/Warangal.

The Chief General Manager/O&M/NPDCL/Warangal.

The Chief General Manager/P&MM/CPDCL/4th Floor, Corporate Office,
Mint Compound, Hyderabad – 500 004.

Copy to:-

The Superintending Engineer/Operation/WGL, KNR, KMM, NZB & ADB.

The Divisional Engineer/Transformers/ WGL, KNR, KMM, NZB & ADB.

The Accounts Officer/Expr. O/o. SE/Opn./ WGL, KNR, KMM, NZB & ADB.

The Asst. Divisional Engineer/Stores/ WGL, KNR, KMM, NZB & NML.

The Divisional Engineer/IT/TSNPDCL/Warangal :

(Place the Scanned Purchase Order copy in the TSNPDCL Website).

// FORWARDED BY ORDER//

Divisional Engineer/P&MM-2
TSNPDCL/Warangal.

CONTRACT FORM

THIS AGREEMENT made the. day of. 200 Between.(Name of Purchaser) of the one part and.(Name of Supplier) of the other part:

WHEREAS the Purchaser invited bids for certain Materials/equipment and ancillary services viz., (Brief description of Materials/equipment and Services) and has accepted a bid by the Supplier for the supply of those Materials/equipment and services in the sum of(Contract Price in Words and Figures) (hereinafter called "the Contract Price").

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions will have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.

2. The following documents will be deemed to form and be read and construed as part of this Agreement, viz.:

- (a) the Bid Form and the Price Schedule submitted by the Bidder;
- (b) the Schedule of Requirements;
- (c) the Technical Specifications;
- (d) the General Conditions of Contract;
- (e) the Purchaser's Notification of Award.

3. In consideration of the payments to be made by the Purchaser to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Purchaser to provide the Materials / equipment and services and to remedy defects therein in conformity in all respects with the provisions of the Contract.

4. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the Materials / equipment and services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

Brief particulars of the Materials/equipment and services which will be supplied/ provided by the Supplier are as under:

	Brief Description of Materials/Equipment & services	Quantity to be supplied	Unit Price Rs.	Total Price Rs.	Delivery Terms

TOTAL VALUE: (Rupees ______only)

DELIVERY SCHEDULE:

IN WITNESS whereof the parties hereto have caused this Agreement to be executed on the day and year first above written.

Signed, Sealed and Delivered by the
said.(for the Purchaser)

in the presence of.

Signed, Sealed and Delivered by the
said.(for the Supplier)

in the presence of.

NOTE: To be executed on a Rs.100/- Non-judicial stamp paper.

Sd/-
(B. ASHOK KUMAR)
CHIEF GENERAL MANAGER,
P&MM/NPDCL/WARANGAL.

ANNEXURE – I
GUARANTEED TECHNICAL & OTHER PARTICULARS

Sl. No.	Description		500kVA, 11/0.433 kV (Amorphous, Copper, Non CSP)
1	Make & Manufacturer		Toshiba make & Toshiba Transmission and Distribution Systems (India) Private Limited
2	Place of manufacture		RUDRARAM, SANGAREDDY DISTRICT, TELANGANA.
3	Voltage Ratio		11000/433V-250V
4	Rating in kVA		500 kVA
5	Core Details:		
	1) Core Grade		Amorphous Metal
	2) Thickness of core plates	mm	0.023 to 0.028
	3) Flux density (Max.)	Tesla	1.4(Max)
	4) Over fluxing without saturation		Not more than 12.5% of declared flux density
	5) Core Details		
	a) No. of core steps		Two (Wound core)
	b) Max. width of first step lamination	mm	284.4 (142.2 x 2)
	c) Stacking Factor		0.86
	d) Core building factor		1.16(approx)
	6) Core diameter	cm	14.22x2 X10.3x2 (Step widthX Step Thickness)
	7) Gross Core area	Sq.cm	585.864
	8) Net Core area	Sq.cm	503.843
	9) Wt. Core	Kg.	1048
	10) Loss per kg. of core at the specified Flux Density	W / kg	0.204 at 1.4Tesla
	11) Core loss in watts		
	a) Normal voltage	Watts	275 (Max)
	b) Maximum voltage	Watts	550(approx)
	12) Power factor magnetizing current (lag max)		Less than 1
	13) Magnetizing (No load) current at		
	a) Normal voltage		2% of full load current(Max)
	b) Maximum voltage		5% of full load current(Max)
	14) Core window height	mm	373
	15) Center to center distance of the core	mm	212/121(Big/Small)
	16) Maximum temperature rise of Core by Thermometer		The temperature shall in no case reach a value that will damage core or its adjacent parts
6	Winding Details:		
	1) Maximum temperature rise of Windings by Resistance method	Deg.C	45
	2) Winding material		
	a) LV		Electrolytic copper
	b) HV		Electrolytic copper
	3) Resistance of windings at 20 Deg.C (with 5% tolerance for LV)		
	a) HV winding	Ohms	1.97 (at rated tap.)(Approx)
	b) LV winding	Ohms	0.001043(Including Leads) (5% tolerance applicable)
	4) No. of LV Turns		16
	5) No. of HV Turns		704(Rated tap)
	6) Size of LV conductor bare/ covered	mm	10.5x2.7/10.93x3.13
	7) Rounding factor for LV		0.549 Sq.mm
	8) No. of parallels		LV-12 parallels, HV-1 parallel
	9) Area of LV cross section	Sq.mm	333.607(Bare)
	10) Size of HV conductor bare/ covered	mm	5.8x1.6/5.92x1.72
	11) Area of HV cross section	Sq.mm	9.0654(Bare)
	12) Current density of LV Winding	Amp/ Sq.mm	2.8(Max)
	13) Current density of HV Winding	Amp/ Sq.mm	2.8(Max) at Rated tap

	14)	Wt. of the HV winding for transformers	Kg.	297 Kg.(Covered conductor+Insulation)
	15)	Wt. of the LV winding for transformers	Kg.	202 Kg.(Covered conductor +Insulation)
	16)	No. of LV Coils/ Phase		1
	17)	No. of HV Coils/ Phase		1
	18)	ID/OD of LV winding	mm	327x238 (Without LV-E Insulation) / 398x301
	19)	ID/OD of HV winding	mm	422x325/525x404
	20)	Height of LV winding	mm	317(Excluding Edge strip)
	21)	Height of HV winding	mm	291(Excluding Edge strip)
	22)	Axial height of HV coil	mm	333(Including Edge strip)
	23)	Axial height of LV coil	mm	333(Including Edge strip)
	24)	Radial depth of LV coil	mm	30.5(approx)
	25)	Radial depth of HV coil	mm	38(approx)
	26)	Full load current HV	Amps	26.243(Line current)
	27)	Full load current LV	Amps	666.686(Line current)
	28)	Full load losses (watts) at 75 Deg. C.	Watts	3344(approx)
	29)	Estimated stray losses	Watts	350 (approx)
	30)	Estimated Breaker losses	Watts	Not applicable
	31)	Total losses (Full load losses + Stray losses+ Breaker losses)	Watts	3825 (Max)
	32)	Calculated Impedence	%	4.5% (Subject to tolerance as per IS 2026)
	33)	Edge strip size on LV coil (top & bottom)	mm	8mm & 8mm
7	Clearances:			
	1)	Size of the duct in HV winding	mm	3
	2)	Size of the duct in LV winding	mm	5
	3)	Size of the duct between HV & LV	mm	4 (min)
	4)	HV winding to LV clearance	mm	11 (Min)
	5)	HV winding to tank clearance	mm	30 (min)
	6)	HV to earth creepage distance	mm	280
	7)	LV to earth creepage distance	mm	25
	8)	Clearances (minimum)		
	a)	Core and LV	mm	5
	b)	LV & HV	mm	11
	c)	HV Phase to Phase	mm	10
	d)	End insulation clearance to Earth	mm	25mm(HV to Core yoke)
	e)	Any point of winding to tank.	mm	30mm
8	Heat Dissipation Calculations:			
	1)	Maximum temperature rise of oil by Thermometer	Deg.C	40
	2)	Transformer (minimum)		
	i)	Overall Length x Breadth x Height	mm	1940x1130x1795
	ii)	Tank Length x Breadth x Height	mm	1610x645x902.5
	iii)	Height of oil level in tank	mm	902.5
	iv)	Thickness of plates		
	a)	Side Walls (Min.)	mm	4 (Nominal thickness as per IS 1852)
	b)	Top & Bottom plate (Min)	mm	6 (Nominal thickness as per IS 1852)
	3)	Radiation:		
	1)	Heat dissipation by tank walls exclusive top & bottom		500W/Sq.m
	2)	Heat dissipation by cooling tube		Not Applicable;Corrugations are provided
	3)	Dia & thickness of cooling tube		Not Applicable;Corrugations are provided
	4)	Whether calculation sheet for selecting cooling area to ensure that the transformer is capable of giving continuous rated output without exceeding temperature rise & also transformer tank size is sufficient is enclosed.		Yes
	5)	Minimum free space available above oil level		Not Applicable

	4)	Weight content of			
		a)	Core lamination (Min)	Kg.	1048
		b)	Windings (Min)	Kg.	499 Kgs. [451 Kgs.(Covered Conductor)+48Kgs.(Insulation)]
		c)	Tank and fittings	Kg.	560
		d)	Oil	Kg.	620(first filling)
		e)	Oil qty in litres (Min)	Ltrs	760(first filling)
		f)	Core channels, rods, bolts, etc	Kg.	250
		g)	Insulation material inside tank	Kg.	71
		h)	Total weight	Kg.	3000
	5)	Oil Data			
		a)	Qty. for first filling (Min)	Ltrs	760(first filling)
		b)	Grade of oil used		As per Latest version of IS 335
		c)	Maker' s Name		Toshiba make/equivalent
		d)	BDV at the time of filling		60kV rms
9	Efficiency, Regulation and other particulars:				
	1)	Efficiency at 75°C		%	UPF / 0.8PF
		a)	125% load		99.01/98.77
		b)	100% load		99.19/98.99
		c)	75% load		99.36/99.20
		d)	50% load		99.51/99.39
		e)	25% load		99.59/99.49
	2)	Regulation at			
		a)	Unity P.F		0.86
		b)	0.8 P.F. at 75 Deg.C		3.32
	3)	Percentage Impedence at 75 Deg.C			4.5% (Subject to tolerance as per IS 2026)
	4)	Flash Test			
		a)	HV 28KV / 50 HZ for 1 minute		HV - 28 kV rms for 1 min.
		b)	LV 3 KV / 50 HZ for 1 minute		LV - 3 kV rms for 1 min
	5)	Over potential Test Double Voltage and Double frequency for 1 minute.			22kV on HV by applying 0.866kV on LV at 100Hz for 1 min
	6)	Impulse test			95kV peak
	7)	Inter layer insulation provided in design for			
		1)	Top & Bottom layer		Epoxy dotted Kraft Paper
		2)	In between all layer		Epoxy dotted Kraft Paper
		3)	Details of end insulation		Press Board,FRP, Kraft Paper
		4)	Whether wedges are provided at 50% turns of the HV coil		Yes
	8)	Insulation materials provided			
		a)	For conductors		
			i) HV		Super Enamel Covering
			ii) LV		Double Paper Covering
		b)	For core		Not Applicable (Since the resistivity of Amorphous is more)
	9)	Is the name plate gives all particulars are required in tender			Yes
	10)	Particulars of Bushing HV / LV			
		1)	Maker' s Name		Jaipur Glass & Potteries/Bikaner Porcelain Pvt.ltd/CJI Porcelain Pvt Ltd/Genesis enterprises/Highvolt Ceramics/SEL/Equivalent
		2)	Type IS-3347 / IS-1180		IS :3347,IS:1180
		3)	Rating as per IS		HV 17.5 kV / 250 Amps, LV 1 kV / 1000 Amps
		4)	Dry power frequency voltage withstand test		28KV rms for HV,5KV rms for LV
		5)	Wet power frequency voltage withstand test		28KV rms for HV,5KV rms for LV

	11)	Particulars of metal oxide lightning arrestor	'Arcing horns provided
	12)	Medium of free space above oil level Transformer	'Not Applicable
	13)	Details of type tests conducted (indicating rating, year of testing, details of tests)	500 KVA : Short circuit Test : Date of Test : 25th, 26th, 29th, 30th August, 1st, 7th, 8th, 9th & 16th September 2016 500 KVA : Impulse Test : Date of Test : 02.09.2016

Sd/-
(B. ASHOK KUMAR)
CHIEF GENERAL MANAGER,
P&MM/NPDCL/WARANGAL.