

By Regd. Post Ack. Due :**In duplicate :****NORTHERN POWER DISTRIBUTION COMPANY OF T.S. LIMITED**
CORPORATE OFFICE, WARANGAL-506 001.**(PURCHASE ORDER)****Phones: 0870-2461507.****Ph : 040-23812955.****Mail.Id.cgmpmm@tsnpsdcl.in****Tele Fax: 040- 23702046.****From**The Chief General Manager / P&MM,
2-5-31/2, 1st Floor, Vidyuth Bhavan,
T.S.N.P.D.C.L, Corporate Office,
Nakkalagutta, Hanamkonda,
Warangal – 506 001.**To**M/s. Hi-Power Electrical Industries,
Factory : Unit-I, D-4, 4/1, Phase-V,
IDA, Patancheru,
Medak Dist.**GSTIN No. 36AABCN2875L3Z1.**

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P.O.No.CGM/P&MM/NPDCL/Wgl./GM/DE-2/A3/PM-5844/18, Dt.28-02-2019.

Dear Sir,

Sub :-P&MM - NPDCL - Wgl – Purchase Order for supply of **480 Nos.**
3-Phase 63 KVA Amorphous CSP type Aluminium Conductor
Distribution Transformers with BIS Energy Efficiency Level-3
(Star-2) – Issued – Reg.

Ref:- 1. Tender Specification No. OT-64/2018-19.
2. PO No.CGM/P&MM/NPDCL/Wgl/GM/DE-2/A3/OT-64/18-19/
D. No. 6532/18, Dt.21-02-2019.
3. Your acceptance letter Dt.25.02.19, received Dt. 25.02.19.

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- 1. Acceptance :-** I, acting for and on behalf of and by the order and direction of the TSNPDCL accept the rate for supply of 3-Phase 63 KVA Amorphous Core CSP type Aluminium Conductor Distribution Transformers with BIS Energy Efficiency Level-3 (Star-2) with guaranteed losses as per Clause-6.0, “Schedule of Materials” as per the above cited correspondence subject to the following terms and conditions.
- 2. Prices :-** The prices noted below are in rupees free at destination stores (FADS) inclusive of Freight & Insurance, inclusive of SGST@9% & CGST@9%. The prices are variable as per IEEMA Formula/Tender Specification with **base date as on 01-11-2018** with 30% ceiling on positive side and no ceiling on negative side.

Cost of CSP component is **Rs. 2,500.00/-** which is included in Ex-works and is a firm price.

For Aluminum Winding:

$$P = \frac{P_0}{100} \left\{ 10 + 19 \frac{AL}{AL_0} + 30 \frac{ES}{ES_0} + 13 \frac{IS}{IS_0} + 4 \frac{IM}{IM_0} + 11 \frac{TO}{TO_0} + 13 \frac{W}{W_0} \right\}$$

Any variation up or down 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 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.

The unloading charges at destination stores shall be to TSNPDCL's account.

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

3. Schedule of Materials:-

| Sl. No. | Description | Qty. in Nos. | FADS Rate per Unit in | | Amount | |
|--|--|-------------------|-----------------------|-------------|-----------------------|-----|
| | | | Rs. | Ps. | Rs. | Ps. |
| 1 | 11KV/433 – 250V 63 KVA CSP oil immersed naturally cooled three phase, 50 Hz double wound, Amorphous Core Aluminium Winding, outdoor 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-I) : 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 Maximum Losses @ 50% – 300 W (Max) Maximum Losses @100% – 1050 W (Max) | 480 | Ex Works | : 92,895.00 | 5,29,99,684.80 | |
| | | F&I | : 677.89 | | | |
| | | SGST @ 9% | : 8421.56 | | | |
| | | CGST @ 9% | : 8421.56 | | | |
| | | Total Cost | : 1,10,416.01 | | | |
| TOTAL | | 480 | | | 5,29,99,684.80 | |
| (Rupees Five Crores Twenty Nine Lakhs Ninety Nine Thousand Six Hundred and Eighty Four and Eighty Paise Only) | | | | | | |

- The Transformer shall be supplied with arcing Horns
- 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.
- The transformers shall be supplied as per the Spec.No.OT-64/2018-19.

4. Delivery :- The supplies shall be made as follows :

| Date | Quantity in Nos. |
|--------------|------------------|
| 15.04.2019 | 80 |
| 31.05.2019 | 150 |
| 30.06.2019 | 100 |
| 31.07.2019 | 75 |
| 31.08.2019 | 75 |
| Total | 480 |

- However you may advance the supplies to meet the urgent requirements of TSNPDCL's works.
- Delay in delivery of materials free at destination stores due to non availability of transport facility and such any reasons will not be considered. It is the responsibility of the supplier to make alternate arrangements for transporting the materials, so as to see the Material reaches the destination within the stipulated period.
- The Company shall have the right to vary the delivery schedule mentioned in the Purchase Order due to any operational exigencies at any time during the execution of the order by the supplier after due notice.

- d). Unloading of the materials at destination stores shall be TSNPDCL's responsibility and any expenditure incurred for unloading is to TSNPDCL's account only.
- e). The Company shall have the right to vary the ordered quantity by + or - 50% at any time during the execution of the order.

5. Oil :

The insulating oil shall comply with the requirements of relevant standards IS :335/1993. Total minimum oil volume is :-

| Sl. No. | Rating in KVA | Oil in Ltrs. (Including of oil observed in core coil) | Permissible oil absorption |
|---------|---------------|---|----------------------------|
| 1 | 63 | 180 | 7 Ltrs. |

6. LOSSES :

The total losses (includes no- load & load losses) at 50% and 100% loading equivalent to BIS EE 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 |
|------------|---------------|-------------------------------|--------------------------------|
| 63 | 11000/433 V | 300 | 1050 |

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

7. 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 supplier, penalty shall be recovered from the firm 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.

For large variation in losses the purchase order is liable for cancellation.

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 firm 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.

If necessary, one transformer will be selected from any lot and will be sent to CPRI for loss measurement at supplier's cost

8 DESIGN & CONSTRUCTION

8.1. CORE : AMORPHOUS METAL:

- a). The core shall be high quality Amorphous ribbons having very low loss formed into wound cores of rectangular shape, bolted together to the frames firmly to prevent vibration or noise. The complete design of core must ensure permanency of the core loss with continuous working of the transformers. The value of the flux density allowed in the design shall be clearly stated in the offer. Curve showing the properties of the metal shall be attached with the offer.
- b). Core Clamping – Amorphous Metal and CRGO wound core Transformers
 1. Core clamping shall be with top and bottom U-shaped core clamps made of sheet steel clamped with MS tie rods for efficient clamping.
 2. MS core clamps shall be painted with varnish or hot oil resistant paint
 3. Suitable provision shall be made in the bottom core clamp/bottom plate of the transformer to Arrest movement of the active part.
- c). The transformer core shall be suitable for over fluxing (due to combined effect of voltage and frequency upto 12.5% without injurious heating at full load conditions and shall not get saturated. The supplier shall furnish necessary design data in support of this situation.
- d). **Flux density should not be more than 1.38 Tesla for Amorphous core.** “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% maximum of full load current”.. Test for magnetic balance by connecting the LV phase by phase to rated phase voltage and measurement of an, bn, cn voltage will be carried out.

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

The supplier should offer the core for inspection and approval by the purchaser during manufacturing stage. Supplier shall give note for inspection with the following documents as applicable as a proof of towards use of prime core material.

1. Invoices of supplier
2. Mill's test certificate
3. Packing list.
4. Bill of landing
5. Bill of entry certificate by custom
6. Description of material, electrical analysis, Physical inspection, certificate for surface defects, thickness and width of the material.
Subjecting to at least 10% of the transformers to routine tests and no load and load loss measurement

It is note that, using seconds /defective CRGO sheets or Load losses found to be more than stipulated limit, heavy penalty will be imposed or the suppliers will be black listed.

8.2 WINDINGS: Winding material shall be as per specification.

Material : Double paper covered insulated electrolytic/Super Enamel Aluminum conductor shall be used.

- a) Current density for HV and LV should not be more than **1.6 A/sq.mm**

- b) All delta leads from the HT Coils as well as HT line leads should be taken out through DPC covered copper wires of sufficient cross sectional area, to impart the desired strength. The current density in HV lead wires shall not exceed 0.8 A/ Sq.mm.
- c) L.V winding shall be in even layers so that neutral formation will be at top.
- d) Vertical ducts and spacers shall be provided within each coil for HV & LV windings. Dovetail spacers are not applicable in case of wound core construction, since it has a single coil. However, ducts shall be provided as per specification.
- e) Wedges of 3 mm shall be provided at 50% of the HV coil and LV coils in all types of transformers.
- f) The no. of HV coil for HV winding is **one/multi coils** for stacked core and one for wound core /amorphous core transformers.
- g) Proper binding of inter layer insulation with the conductors shall be ensured. Test for binding strength conducted.
- h) Dimensions of winding coils are very critical. Dimension tolerance for winding coils shall be within limits **(+5%** and no negative tolerance).
- i) Inter layer insulation shall be *Epoxy dotted paper. Minimum 2 Nos. of 2 mil Epoxy Dotted papers are to be used for interlayer insulation in HV & LV winding.*
- j) Formation of Delta on HV side shall be with 13 SWG super enameled copper wire with multi layered (not less than 13 layers) paper insulation. Necessary resin bonded paper insulation tubes or bakelite bits may be used through. This shall be done with ferrules and crimping/brazing.
- k) The HT jumpers from winding to the HT bushing (fuse link) inside the transformer should be provided with lugs to bolts and nuts. The jumper wires should pass through resin bonded paper cylinders and fiberglass sleeves.
- l) The star point shall be done with and aluminum ferrules and crimping.
- m) The Un-balanced current i.e., current flowing in neutral during Short Circuit test at full load current shall not be more than 2% of the full load current.
- n) All the sleeves used in construction shall be fibre glass material.
- o) No tapping shall be provided upto 63 KVA.

8.3 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.

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

8.5 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. **Corrugated type cooling tubes are also accepted.** The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise *and shall accommodate the all materials and free space required.* Supplier shall submit the calculation sheets.

“For Corrugated tanks : Corrugation shall be built up with CRCA sheets of 1.2 mm thickness and Tanks with corrugations shall be tested for leakage test at a pressure of 0.15 kg/cm² measured at the bottom of the tank.

(i) Pressure Release Device: For corrugated tanks, PRD will be provided instead of Explosion vent and it operates at the pressure before 0.25 kg/cm². Corrugated fins shall be provided underneath the LV bushings.

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.

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

- | | | | |
|------|-----------------------------|---|--------------------|
| i) | Side walls (min) | : | 3.15 mm thickness. |
| ii) | Top and bottom plates (min) | : | 5.0 mm thickness. |
| iii) | Bottom plates (Min.) | : | 5 mm thickness. |

8.5.2. 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 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 1Kg/Sq.cm for 10 minutes. 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. The top cover of the tank shall be bent ‘L’ shape four sides to avoid entry of water through cracks of gasket.

8.5.3. 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.*

8.5.4. 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.

- 8.5.5. The tank shall be reinforced by welded angle (40x40x5 mm) on all the outside wall on the edge of the tank to form two equal compartments. **Permanent deflection, when the tank without oil is subject to a vacuum of 525 mm of mercury for rectangular tank shall not be more than 5 mm upto 750 mm length, 6.5 mm upto 1250 mm length, 8 mm upto 1750 mm and 9 mm upto 2000mm.** The tank shall further be capable of withstanding a pressure of 0.8 kg/sq.cm (g) and a vacuum of 0.3 kg/sq.cm (g) without any deformation.
- 8.5.6 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 an 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.
- 8.5.7 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. Two M12 anti theft SS 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.
- 8.5.8. Heat dissipation by tank walls up to oil level should be limited to 500 W/sq.m (excluding top and bottom) cooling tube limited to (300) W/Sq.m. 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 calculations shall be furnished with respect to the maximum 100% load losses specified to the corresponding BEE rating.
- 8.5.9. Lifting Lugs: 2 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.
- 8.5.10. Top cover shall be fixed with 6 mm continuous Neoprene gaskets (Rectangular) without any joint conforming to **IS: 4253 Part-II** will be placed between tank and cover. The bolts outside tank shall have 2 flat washers & one spring washer.
- 8.5.11. The size of the tank shall be such that sufficient space is available for the oil to expand at extreme conditions. The volume of the free space above oil level shall not be less than 55% of the volume of the oil.
- All transformers shall be capable of giving their continuous rated output without exceeding the specified temperature rise.
- 8.5.12 **The sealing:** The space on the top of the oil shall be filled with nitrogen/ dry air. The nitrogen/ 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/ Bakelite of 0.4mm thick 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 shall not be provided for these transformers.

- 8.5.13. 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.

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

8.6.1 Tests for painting.

8.6.2 The painted surface shall be tested for paint thickness.

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

8.7 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 **Air Craft Blue Colour conforming to Paint Shade No. 108 of IS-5 for finishing coats.**

8.8 BUSHINGS :

The bushings shall conform to the relevant standards specified and shall be outdoor. The bushing rods and nuts shall be made of brass material 12 mm diameter for both HT & LT. 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).

8.9 Terminal Connectors:

The LV 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 bi-metallic connectors so as to receive 55 sq.mm conductor for HV Terminal connectors must have type tested as per IS:5561

8.10 Rating Plates and BIS Labeling :

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.

BIS Labeling: ISI labeling 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 labeling is in the account of suppliers only. The certificate of registration issued by BIS shall be submitted.

8.11 Arcing Horns:

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

8.12 FITTINGS : The following standard fittings shall be provided.

- a) Rating and terminal marking plates non detachable -1No.
- 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 0.025 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.
- g) HV bushings – 3 Nos.
- h) LV bushings – 4 Nos.
- i) Stiffener angle 40x40x5 mm (and vertical strip of 50x5 mm flat if required).
- j) Cooling tubes – No. & lengths may be mentioned (as per heat dissipation calculations).
- k) Base channels 75 x 40 mm.
- l) LV epoxy bushings – 4 Nos.
- m) HT fuse links.
- n) Indicating lamp.
- o) Circuit breaker operating mechanism along with operating rod.
- p) 5years guarantee embossed plate welded below name plate.
- q) Tank and over all dimensions.
- r) Weight content of a) core b) windings c) tank & fittings d) weight/qty. of oil e). over all weight.
- s) Oil level guage (30 degC indication).
- t) Oil/Nitrogen/air filling device/pipe with welded cover capable after reuse.

8.13 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.

8.14 MOUNTING ARRANGEMENT : The under base of all transformers shall be provided with two 75 x 40mm channels 460 mm long with holes to make them suitable for fixing on a platform or plinth.

8.15 OVER LOAD CAPACITY: The transformers shall be suitable for loading as per relevant standard (IS-6600/1972). The tendered should state clearly the percentage overload the transformers can take for a continuous period of 1 hour.

9.0 TESTS:

9.1 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 atleast 10% of quantity offered every time.

In addition to the above measurement of losses at 50% load and 100% load calculations at 75 Degrees for 100% transformers is to 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. Heat run test- One unit of the ordered quantity of each rating.
- VI. 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).
- VII. Heat run test shall have to be conducted at suppliers cost on one transformer of each rating, generally 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 unloading of the active part.

The test certificates for all routine and type tests for the transformers and also for the bushings and transformer oil shall be submitted with the tender.

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.

9.2 **TYPE TESTS:**

The transformers offered should have been got type tested. The type test must have been conducted on a transformer (same serial no.) as per the tender specification and shall furnish type test reports along with the bid. Bids without type test reports will be treated as non-responsive.

The following Type tests shall be conducted and reports furnished along with the tender.

1. Impulse voltage test: with chopped wave of IS 2026 part-III. BIL for 11kV shall be 75 kV.
2. Short circuit withstand test: Thermal and Dynamic ability.
3. Temperature Rise Test.

4. Air pressure test as per IS 1180 (Part-1) : 2014
 5. Special tests other type and routine tests, as agreed between purchaser and Tenderer shall also be carried out as per the relevant standards.
 6. Manufacturer's routine test certificates shall be furnished before offering the transformer for inspection.
- 9.2.1 The purchaser or 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.
 - 9.3 **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.
 - 9.4 **TESTING FACILITIES:** The tenderer 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.
 - 9.5 **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.
 - 9.6 **STAGE INSPECTIONS :** The stage inspection of the transformers during the manufacturing/assembling stage shall be carried out by the purchaser's representative. The purchaser have absolute right to reject the raw materials/ components not conforming to the requirements of the specifications or of poor quality/workmanship. The purchaser at his option may collect the samples of the following raw material/ components for his independent testing.
 - a. CRGO lamination : One specimen sheet of 300-500 mm length (for each lot of raw material used by the supplier).
 - b) HV winding wire : 11000 mm length specimen for each type.
 - c) LV winding wire : 1240 mm length specimen for each type.
 - d) Transformer oil : 5 lit. in bottle of 1 Lt. Each.

10. INSPECTION:

All tests and inspection shall be made at the place of manufacturer 10% of the quantity offered inspection for routine tests and 100% transformers for no load and load loss measurement to calculate losses at 50% and 100% and unless other wise especially agreed upon the manufacturer and the purchaser at the time of purchase. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities, without charge to satisfy him that the material is being furnished in accordance with specification.

The manufacturer shall provide all services to establish and maintain quality of workman ship in his works and that of his sub-contractors to ensure the mechanical/electrical performance of components, compliance with drawings, identification and acceptability of all materials, parts and equipment as per latest quality standards of ISO 9000.

Along with the bid the manufacturer shall prepare Quality Assurance Plan identifying the various stages of manufacture, quality checks performed at each stage 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 or his representative before proceeding with manufacturing. However, purchaser or his representative shall have the right to review the inspection reports, quality checks and results of manufacturer's in house inspection department which are not customer hold points and the manufacturer shall comply with the remarks made by purchaser or his representative on such reviews with regards to further testing, rectification or rejection etc. Manufacturer should submit the list of equipment for testing along with latest calibration accredited laboratory valid within one year to the purchaser.

Purchaser shall have every right to appoint a third party inspection to carryout the inspection process. The purchaser has the right to have the test carried out at his own cost by an independent agency wherever the dispute regarding the quality of supply. Purchaser has right to test 100% of the supply selected either from the store or field to check the quality of the product. In case of any deviation purchaser have every right to reject the entire lot or penalize the manufacturer, which may leads to blacklisting among other things.

The Firm shall give 15 days advance intimation to enable the TSNPDCL to depute his representative/ third party agency for witnessing acceptance/ routine tests.

10.1 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.

11. **Performance Security:-** Performance Security to the extent of 10% of the Contract Value shall be furnished for the proper fulfillment of the Contract within 15 days of receipt of Purchase Order, which will include the Guarantee Period and completion of Performance and Guarantee obligations. The Performance Security will cover a period of six months over and above the period of Performance Guarantee against defective supplies etc.

The Performance Security will be,

- 1) A Bank Guarantee in the prescribed proforma issued by a Nationalised/ Scheduled Bank acceptable to the Purchaser.

(OR)

- 2) A Banker's Cheque or Crossed Demand Draft or Pay Order payable at the Head Quarter of the Purchaser.

- 12. PAYMENT :** 100% Payment would be made through cheque on or after 30 days from the date of delivery of materials at the destination stores in good condition duly certified by the consignee (i.e., from the date of issue of Form-13) or after approval of Test Certificates or after submission of bills in full shape whichever is later, subject to furnishing of Performance Security to the extent of 10% of the Contract Value.

NOTE:

- i). The date of delivery would be the date on which the stores officer signs the Form-13 acknowledging receipt of materials at stores and certified the receipt of goods in good condition.
The following documents of title to goods shall be sent by the supplier to the paying officers concerned.
 - a. Detailed packing list.
 - b. Detailed Invoice.
 - c. Test Certificate approval letter.
 - d. Form - 13

With regard to segmenting the equipment i.e., equipment which requires several accessories before it is fully operational and which have been ordered as such the date of receipt will be the date on which the last such accessory is received at the Stores.

- a. The TSNPDCL may at its option get the material inspected by the third party if it feels necessary and all inspection charges in this connection shall be borne by supplier.
- b. The bills of exchange along with the certified receipt of goods and the following documents of title to goods shall be sent by the supplier or his Bankers to the Paying Officer concerned who will accept to release the same.
- ii). You shall furnish the 100% routine Test Certificates for the equipment being offered for inspection along with your offer and got approved by this office before the bills become due for payment, failing which the payment against the bills would be stopped.
- iii). One additional copy of the each delivery challan, Form-13, Invoice, packing list and Test Certificates shall be sent to CGM/P&MM/NPDCL, Warangal, immediately after delivery at destination stores.
- iv). The performance guarantee to be executed in accordance with this Purchase Order shall be furnished on stamp paper of value of Rs.200/-. The bank guarantee shall be extended suitably in case the equipment/ materials found defective within guarantee period. The defective portion/ whole of the equipment/ materials so replaced or renewed should get satisfactory performance till the expiry of 12 months from the date of such replacement/ renewal or until the end of guarantee period whichever is be later.

- 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 this specification, the TSNPDCL reserves the right to collect same from any other amounts and or bank guarantees given by you due to or with the TSNPDCL.
- vi). When you do not at any time, fulfill your obligation in replacing/ rectifying etc., of the damaged/ defective materials/ equipment in part or whole promptly to the satisfaction of the T.S.NPDCL officers, the TSNPDCL reserves the right not to accept the materials/ equipment against subsequent dispatches made by the supplier and only the supplier will be responsible for any demurrages, wharfages or damage occurring to the consignment dispatched.
- 13. Despatch :-** Please arrange to supply the materials specified herein and dispatch them by goods train/ lorry freight prepaid to the persons and destination Stores which will be issued/intimated to you separately.
- 14. 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 acknowledgement of receipt of the goods. A copy of the invoice shall be sent to this office as soon as dispatch is made.
- 15. Loss or Damages :**
- a). You are responsible for the safe delivery of the goods in good 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 results of rough handling in transit or due to defective packing will be intimated within a fortnight of the receipt of the materials. Internal defects, damages or shortages of any internal parts which cannot ordinarily be detected on superficial visual examination though due to bad handling in transit or defective packing would be intimated within 2 months from the date of receipt of these articles. In either case, the damaged or defective materials should be replaced by you free of cost to the 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 cause to be repaired or rectified the defective materials or replace the same and recover the expenditure incurred there for from the deposits such as Earnest Money, Security Deposit and Performance or other monies available with the TSNPDCL or by resorting to legal action and also decline to accept further delivery of materials/equipment.
- d). Where the Plant / Machinery or other materials supplied by you is found 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 receipt of the intimation.
- e). The defective portions or whole of the equipment so replaced or renewed should give satisfactory performance till the expiration of 6 months (six) from the date of such replacement or until the end of guarantee period whichever is later.

- f). For the purpose of any legal construction, the materials shall 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 despatches of materials and the connected bills etc. under conditions of your continued negligence to rectify repair or replace any equipment or materials supplied earlier and received in damaged condition or failed during the guarantee period or not conforming to the Purchase Order/ specification conditions.

16. Guarantee :-

- i). The Conventional 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 below the Name Plate.
- ii). For strict implementation of this Clause you may note :
 - a). On failure of a Transformer, a telegraphic intimation 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 or replace the defective materials 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/ bank guarantees.
 - c). If the Transformer is repaired or replaced beyond 3 months of date of telegraphic intimation to you, you should note that the 5 Year guarantee period will be extended by the number of days by which 90 days are exceeded from the date of telegraphic intimation of failure to you.
 - d). In case the Transformer is repaired or replaced by you after 180 days of date of telegraphic intimation you should note that 5 Year Guarantee will be counted from the date from which the transformer is replaced and commissioned successfully by us.
 - e). The TSNPDCL shall get the Transformer repaired at your cost, in case if you fail to repair in 30 days from the date of intimation.

- 17. 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. Physical verification test.

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.

18. Defective Supplies :- If, during the guarantee period, any of the materials/goods are found to be defective in materials or workmanship, they shall be replaced by you free of cost.

19. Penalty for Late Delivery :-

i). **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 ½ % 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.

20. 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, lockouts, riots freight embargoes and provided that you shall within ten (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. No price variation shall be allowed during the period of Force Majeure and penalty would not be levied for this period.

- 21. Extension 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 contract.
- 22. 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.

23. 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.

- 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.

- 24. Guaranteed Technical Particulars :** The technical particulars as per Annexure-I have been guaranteed by you for the supplies against this order.

- 25. Despatch Instructions :** All the materials detailed in Clause-3 must be consigned and despatched as per despatch 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/Dist.Stores/ NPDCL | Paying Officer to whom bills & RR to be sent to Accounts Officer/ Expr.,O/o.SE/OP. |
|---------|---------------------------------------|--|--|
| 1 | Warangal | Warangal | Warangal |
| 2 | Karimnagar | Karimnagar | Karimnagar |
| 3 | Khammam | Khammam | Khammam |
| 4 | Nizamabad | Nizamabad | Nizamabad |
| 5 | Nirmal | Nirmal | Adilabad |

26. Packing :-

- i). The packing may be in accordance with the manufacturer's standard practice unless otherwise specified. You should however ensure that the packing is such that the equipment reach the departmental stores without damages after transport by Road. The packing should withstand unloading and inter stores transfer with reasonable care.
- ii). Whenever you despatch materials to consignee. You should prepare the following information in the form of packing slip in quadruplicate and send the same to the consignee and obtain his acknowledgement 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 SLIP

1. Purchase Order No. and Date.
 2. Qty. allotted to the stores and rate applicable.
 3. Qty. so far supplied to the stores and rate applied.
 4. Qty. now supplied and rate applied.
 5. Total qty. supplied under the Purchase Order with rates applied.
 6. Programme for supplying the balance quantity to the stores.
- iii). You shall invariably send to the Purchasing Officer a copy of the delivery challan whenever materials are despatched.

27. Note :- It may be noted that

- a). The prices 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, Sl.No. and the year of Manufacture, capacity and other details as specified in the relevant ISS or other specification stipulated. The Purchase Order No. & date and Year of supply and the words "TSNPDCL" must be etched on the Name Plate. 50% full load / 100% load losses to be furnished on the name plate.

- 28. 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.
- 29. 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 supplier 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"**.

30. General:-

- i). Your bills in duplicate along with a duplicate copy of invoice and sub standing vouchers for all extra claims to be made separately should be forwarded to the paying officers mentioned in the dispatch instructions.
- ii). All General and technical correspondence should be addressed to the Chief General Manager/P&MM, Corporate Office, 1ST Floor, Vidyut Bhavan, TSNPDCL, Hanamakonda, Warangal – 506 001.
- iii). All correspondence regarding bills, payments etc., should be addressed to the Paying Officers, cited in dispatch instructions with a copy to the Pay Officer, TSNPDCL, Warangal.
- iv). All and any disputes or differences arising out of or touching this order shall be decided by courts or tribunals situated in Warangal/ Hanamakonda cities. No suit or other legal proceedings shall be instituted elsewhere.
- v). Unless otherwise, specified, you shall abide by all the terms and conditions specified in the Specifications No.OT-64/18-19.

- vi. This is in regularization of preliminary acceptance Lr. No. CGM/P&MM/NPDCL/WGL/GM/DE-2/A3/OT-64/18-19/D.No.6532/18, Dt.21.02.19.
- vii). Please return within a period of 15 days one copy of the Purchase Order duly signed in token of acceptance of all terms and conditions of this order.

Encl: GTP

**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/MRT & EA/NPDCL/Warangal.
The Chief General Manager/Operation – I & II/NPDCL/Warangal.
The Chief General Manager/P&MM/TSSPDCL/4TH Floor, Corporate Office
Mint Compound, Hyderabad – 500 004.

Copy to :-

The Superintending Engineer/Opn./WGL (Urban), WGL (Rural), Jangoan,
Mahabubabad, Bhupalpally, KNR, Jagitial, Peddapally, KMM & Kothagudem,
NZB, Kamareddy, ADB, NML, Mancherial & Asifabad.
The Divisional Engineer/MRT's/TSNPDCL/ WGL (Urban), WGL (Rural), Jangoan,
KNR, Jagitial, Peddapally, KMM & Kothagudem, NZB, Kamareddy, NML &
Mancherial
The Accounts Officer/Expr., O/o. SE/OP./WGL, KNR, KMM, NZB & ADB.
The Asst. Divisional Engineer/Dist. Stores/WGL, KNR, KMM, NZB & Nirmal.
The General Manager/IT/TSNPDCL/Warangal :

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

// FORWARDED BY ORDER//

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

GTP-1

ANNEXURE – I

| GUARANTEED TECHNICAL & OTHER PARTICULARS FOR DISTRIBUTION TRANSFORMERS | | |
|---|---|---|
| Sl. No. | Description | 63KVA |
| 1 | Make & Manufacturer | Hi-Power Electrical Industries |
| 2 | Place of Manufacture | Patancheru Medak Dist. |
| 3 | Voltage Ratio | 11000/433 |
| 4 | Rating in KVA | 63KVA |
| 5 | Core Details : | |
| 1 | Core Grade | Amorphous |
| 2 | Thickness of core plates | 0.025 -0.030mm |
| 3 | Flux density (Max) | 1.38 Tesla |
| 4 | Over fluxing without saturation | 12.5% |
| 5 | Core Details. | |
| | 1) No. of Core steps. | Single |
| | 2) Max. width of first step lamination. | 170.2mm |
| | 3) Stacking factor | 0.88 |
| | 4) Core building factor. | 42% |
| 6 | Core diameter | 170.2 x 42.6x2mm |
| 7 | Gross Core area | 145.01 Sq.cm |
| 8 | Net Core area | 127.61Sq.cm |
| 9 | Wt. Core | 190 Kg |
| 10 | Loss per Kg of core at the specified Flux Density | 0.2 Watts per kg |
| 11 | Core loss in watts | |
| | (A) Normal Voltage | 55 Watts |
| | (B) Maximum Voltage | 165 Watts |
| 12 | Power factor magnetizing current (max) | 0.2 Lag(Max) |
| 13 | Magnetizing (No load) current at | |
| | (A) Normal Voltage | 3% of Full load current |
| | (B) Maximum Voltage | 6% of Full load current |
| 14 | Core window height | 315 mm |
| 15 | Center to center distance of the core | 161/86 mm |
| 16 | Maximum temperature rise of Core by Thermometer | The Temperature shall in no case reach a value that will damage core its adjacent |
| 6 | Winding Details : | |
| 1 | Maximum temperature rise of Windings by resistance method | 40 Deg.C |
| 2 | Winding material : LV : HV | Aluminum |
| 3 | Resistance of windings at 20 Deg. C (with 5% tolerance) | |
| | a) HV Winding (ohms) | 40.396 Ohms/Ph |
| | b) LV winding (ohms) | 0.01595 Ohms/Ph Nominal (Excluding Breaker) |
| 4 | No. of LV Turns | 64 |
| 5 | No. of HV Turns | 2816 |
| 6 | Size of LV conductor bare/covered | 8.1x3.1mm/8.5x3.5mm |
| 7 | Rounding Factor for LV | 0.55 |
| 8 | No. of parallels | Single |
| 9 | Area of LV cross section (sq.mm) | 73.68 Sq.mm |

| | | |
|----------|--|--|
| 10 | Size of HV conductor bare/covered | Ø1.52 mm/ Ø1.77 mm |
| 11 | Area of HV cross section (sq.mm) | 1.815 Sq.mm |
| 12 | Current density of LV winding | <1.6 Amp/sq.mm |
| 13 | Current density of HV winding | <1.6 Amp/sq.mm |
| 14 | Wt. Of the HV winding for transformers | 40Kg (Min). |
| 15 | Wt. Of the LV winding for transformers | 25Kg (Min). |
| 16 | No. of LV Coils/Phase | One |
| 17 | No. of HV Coils/Phase | One |
| 18 | ID/OD of LV winding | 181x94 / 231x138mm |
| 19 | ID/OD of HV winding | 253x160 / 335x236 mm |
| 20 | Height of LV winding | 300 mm |
| 21 | Height of HV winding | 300 mm |
| 22 | Axial height of HV coil | 265 mm |
| 23 | Axial height of LV coil | 290 mm |
| 24 | Radial depth of LV coil | 25/22 mm |
| 25 | Radial depth of HV coil | 41/38 mm |
| 26 | Full load current HV | 3.31Amps |
| 27 | Full load current LV | 84 Amps |
| 28 | Full load losses (watts) at 75 Deg. C | 925 Watts |
| 29 | Estimated stray losses | 30Watts |
| 30 | Total Losses(Full load losses+ stray losses+ Breaker Losses) | 980 Watts |
| 31 | Maximum losses at 50% loading | 300Watts |
| 32 | Maximum losses at 100% loading | 1050Watts |
| 33 | Calculated Impedance | 4.5% |
| 34 | Edge strip size on LV coil (top & Bottom) | 5mm+5mm |
| 7 | Clearances : | |
| 1 | Size of duct in HV winding | 3mm |
| 2 | Size of duct in LV winding | 3mm |
| 3 | Size of the duct between HV & LV | 3+3mm |
| 4 | HV winding to LV clearance | 11mm |
| 5 | HV winding to tank clearance | Non Bushing Side – 30 mm Bushing Side - 40mm |
| 6 | HV to earth creepage distance | 25mm per KV |
| 7 | LV to earth creepage distance | 25mm per KV |
| 8 | Clearances (minimum) | |
| | a) Core and LV | 4mm |
| | b) LV to HV | 11mm |
| | c) HV phase to phase | 10mm |
| | d) End insulation clearance to earth | 25mm |
| | e) Any point of winding to tank | 30mm on Length side 40mm on width side |
| 8 | Heat Dissipation Calculations : | |
| 1 | Maximum temperature rise of Oil by Thermometer | 35 Deg. C |
| 2 | Transformer (minimum) | |
| | 1). Overall length x breadth x height | 1080 x 900 x 1110 mm |
| | 2)Tank length x breath x height | 895 x 420x 865 mm |
| | 3)Height of Oil level in tank | 600mm |
| | 4)Thickness of plates | |
| | a) Side walls (min.) | 3.15 mm (+/- Tolerance as per IS 1852) |
| | b)Top & bottom plate (min.) | 5mm (+/- Tolerance as per IS 1852) |

| | | | |
|---|--|---|--------|
| 3 | Radiation: 1) Heat dissipation by tank walls exclusive top & bottom | 500 Watts /Sqmt. Upto Oil Level. | |
| | 2) Heat dissipation by cooling tube | 300 Watts/Sqmt. | |
| | 3) Dia & thickness of cooling tube | 400x226x3Fins-2Raadiator, 1.25Thick | |
| | 4) Whether calculation sheet for selecting cooling area to ensure to ensure that the transformer is capable of giving continuous rated output without exceeding temperature rise & also transformer tank size is sufficient is enclosed. | Heat dissipation calculation sheet enclosed | |
| | 5) Minimum free space available above oil level. | 55% of free space above oil level | |
| 4 | Weight content of | | |
| | a) Core lamination (min.) | 190 Kg | |
| | b) Windings (min.) | 65 Kg | |
| | c) Tank & Fittings | 135 Kg | |
| | d) Oil | 148 Kg | |
| | e) Oil Quantity in litres (min.) | 180 Lts | |
| | f) Core channels, rods, bolts, etc | 15 Kgs | |
| | g) Insulation material inside tank | 9 Kgs | |
| | h) Total Weight | 565 Kg | |
| 5 | Oil Data | | |
| | 1) Quantity of Oil first filling (min.) | 180 Ltrs | |
| | 2) Grade of oil used | As per IS-335 latest version | |
| | 3) Maker's name | Savitha or Reputed Make | |
| | 4) BDV at the time of filling | 50kV | |
| 9. Efficiency, Regulation, and other particulars : | | | |
| 1) | Efficiency at 75 Deg. C | Unity PF | 0.8PF |
| | a) 1100% | 98.03% | 97.55% |
| | b) 100% | 98.39% | 98.00% |
| | c) 75% | 98.74% | 98.43% |
| | d) 50% | 99.07% | 98.84% |
| | e) 25% | 99.30% | 99.12% |
| 2 | Regulation at | | |
| | a) Unity P.F. | 1.55% | |
| | b) 0.8PF at 75 Deg C | 3.778% | |
| 3 | Percentage Impedance at 75 Deg. C | 4.5% (+/- IS Tolerance) | |
| 4 | Flash Test | | |
| | a) HV 28 KV/50Hz for I minute | Yes | |
| | b) LV 3 KV/50 Hz for 1 minute | Yes | |
| 5 | Over potential Test Double Voltage & Double frequency for 1 minute | 866V for 1 minute | |
| 6 | Impulse test | 75 kVp | |
| 7 | 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% turn of the HV coil. | Epoxy Dotted Paper Epoxy Dotted Paper Press Board Provided | |
| 8 | Insulation materials provided a) For Conductors | | |
| | 1) HV | Double Paper Covering | |
| | 2) LV | Double Paper Covering | |
| | b) Core | Not applicable | |
| 9 | Is the name plate gives all particulars are required in | Yes | |

| | | |
|----|--|---|
| | tender | |
| 10 | Particulars of Bushing HV/LV | |
| | 1) Maker's name | BEI/BPPL/Shine/Any reputed make |
| | 2) Type IS-3347/IS-1180 | Yes |
| | 3) Rating as per I.S. | 17.5kV, 250Amps for HV 1.1kV, 250Amps for LV |
| | 4) Dry power frequency voltage withstand test | 28kV RMS for HV 3kV RMS for LV |
| | 5) Wet power frequency voltage withstand test | 28kV RMS for HV 3kV RMS for LV |
| 11 | Medium of free space above oil level Transformer | Dry Air |
| 12 | Details of type tests conducted (indicating rating, year of testing, details of tests) | Enclosed. |

Sd./-
(B. ASHOK KUMAR)
CHIEF GENERAL MANAGER,
P&MM/NPDCL/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.200/- Non-judicial stamp paper.

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