SCHEDULE – II

SCHEDULE OF FITTINGS FOR CONVENTIONAL DISTRIBUTION TRANSFORMERS

The fittings on the transformers shall be as under:

1. Rating and diagram plate - 1 No.
2. Earthing terminals with lugs - 2 Nos.
3. Lifting lugs 8 mm thick - 2 Nos. Upto 100 KVA and 4 Nos. Above 100 KVA
4. Oil filling hole with cap on conservator - 1 No.
5. Conservator with drain plug - 1 No.
6. Thermometer pocket - 1 No.
7. Aluminium Die cast Silica gel breather - 1 No.
   (500 gms. capacity upto 200 KVA and 1000 gms. for 315 & 500 KVA.)
8. Platform mounting channel - 2 Nos.
   (with hole suitable for axle of roller for transformers of 200 KVA and above rating)
9. Oil level gauge indicating three position of oil marked as below :
   a - Minimum (-)5^{o} C
   b - 30^{o} C
   c - Maximum 98^{o} C
10. Bushings :
    H.T. - 3 Nos.
    L.T. - 4 Nos.
    Each bushing should be provided with 3 Nos. of Brass/tinned Copper nuts and 2 plain Brass/tinned Copper washers for connecting terminal.
11. Radiator - Details shall be given as per drawing (to be provided on L.V. side upto 100 KVA).
12. Arcing horn for H.T. Bushings - 6 Nos.
13. Pulling lugs - 4 Nos.
14. Explosion vent in case of transformers of 200 KVA and above. - 1 No.
15. Metallic cover spot welded to tank for drain valve to be provided.
16. Rollers for 200 KVA and above - 4 Nos. (150 mm dia and 50 mm wide)
17. Filter valve - 32mm dia for 200 KVA and above - 1 No.
18. Off circuit tap changing switch with indicator handle and locking device with tap ranging from (+) 3% to (-) 9% in steps of 3% on HV side for HV variation. Direction of rotation marked. - 1 No.
19. Top cover lifting lugs - 2 Nos.
20. Bimetallic connectors for all ratings to be fitted on the studs:
    HV - 3 Nos.
    LV - 4 Nos.

Note: Transformers provided with Aluminium stems Nuts & Washers will not be accepted.

Chief Engineer (S&P-EZ)
MPPKVVCL : Jabalpur

SCHEDULE – III

NAME PLATE DETAILS FOR DISTRIBUTION TRANSFORMERS

The rating and terminal marking plate shall exhibit the following details:

1. MAKE of Transformer

2. Manufactured by M/s. . . . . .

3. Specification Ref. No. – IS-1180 & 2026/1977 (latest version) & REC*

4. Type of Design - New.

KVA Capacity _____(Conv.) Type of cooling - ONAN

Volts at No Load HV 11000 Frequency Hz - 50
LV 433 Impedance volts %

Amperes Full Load HV _____ LV _____ Vector group Ref. –Dyn - 11
Core & winding Assembly Wt. In Kgs. ____

Phases HV 3 Wt. of oil in Kgs. _____
LV 3 Total Wt. in Kgs. _____

Makers S.No. _____ Oil in Ltrs. _____
Date of dispatch _____ Untanking Wt. in Kgs.

Guaranteed maximum temperature rise in oil 45^0 C

Consumers Ref. Order No.CE(S&P-EZ)/SE(P)-I/ORD/_____ Dt.____

Guarantee Period : 36 Months from the date of dispatch and after repairs within GP, a minimum period of 12 Months.

CUSTOMER - MADHYA PRADESHP POORV KSHETRA VIDYUT VITARAN COMPANY LTD., JABALPUR
Year of Manufacture :

Terminal marking / Winding diagram	Dyn 11 diagram					
Switch Position	HV Volts Across			LV Volts across			Connection in each phase
	1U	1V	1W	2U	2V	2W	
1 to 5							

ALUMINIUM / COPPER** WOUND TRANSFORMER WITH DPC INSULATION ON LV AND HV SIDE

* Applicable upto 100 KVA only.
** For 315 & 500 KVA rating only.

Signature of the
representative of the firm

SCHEDULE – IV

GUARANTEED TECHNICAL PARTICULARS FOR CONVENTIONAL DISTRIBUTION TRANSFORMERS

Sl. No.	Particulars	63 KVA	100 KVA	200 KVA	315 KVA
1	Continuous Max. Rating (KVA)				
2	Normal Ratio of Transformation	- 11/0.433 KV -			
3	Method of Connection (Vector Group)	- Dyn 11 -			
4	Max. Hot spot Temp.(ambient air - temp. shall be taken as 50°C).				
5	**Max. oil temp. (Ambient air** temp. taken as 50°C).	- 95 °C -			
6	Max. winding temp. (ambient air temp. taken as 50 °C).	- 100 °C -			
7	Flux Density	1.55 Wb/m^2 (Max.)			
8	Type of transformer	Core type			
9	**CORE** : (a) Core Material & Grade (b) No. of steps (c) Dimensions of core steps (d) Core diameter (e) Core length (leg centre) (f) Window height (g)Insulation between bottom of core & Base channel (h)Core height (inclusive of Base channel and insulation in between) (i) Gross core area (j) Effective core area (k)Nos. & Dimensions of steel channel used for clamping of core (l)Size & No.of : (i) Core bolts (ii) Tie rods (m) Insulation of core bolts (i) Core bolts (ii)Tie rods (n) Painting of core channel, Core bolts & Tie Rods (o) Whether top yoke is cut or holes are made for LV connections. If yes, whether enforcement is done. (p) Size of support channel for core base (cut channels are not acceptable). (q) Weight of core only (without Channels etc.) (r) Whether yoke construction is in one piece: (i) Top	----CRGO -----GR----			

Sl. No.	Particulars	63 KVA	100 KVA	200 KVA	315 KVA
	(ii) Bottom				
10	**Magnetizing current** (% of rated current): (a) at 90% Voltage (b) at 100% Voltage (c) at 112.5% Voltage (d) Tolerance				
11	**Current Density** (i) HV winding (ii) LV winding				
12	**WINDINGS** (a) Material (iii) HV winding (iv) LV winding (b)Size of winding wires for (i) H.T. (ii) L.T. (c)Type of insulation of (i) HV winding (ii) LV winding			Aluminium upto 200KVA ratings. Electrolytic Copper for 315KVA rating	
	(d)Internal & external diameter of (i) HV coil (ii) LV coil (e) No. coils/phase (i) HV (ii) LV (f) No. of turns per coil (i) HV (ii) LV (g) Method of connection of winding ends to bushing terminals: (i) For HV - The one end of HV winding brazed with copper wire and other end of copper wire bolted with HV stud by forming eye loop and using washer of proper size. (ii)For LV- Other end of LV winding crimped with Aluminium/Copper lugs and then bolted with LV stud terminals with proper size of washers. (iii)**Method of forming of Star Connection**:- All the three ends of LV windings crimped with proper size of Aluminium/copper lugs and then bolted with Aluminium/copper Flat of 6mm thick & cotton tape wrapped over it.				

Sl. No.	Particulars	63 KVA	100 KVA	200 KVA	315 KVA
	(h) Resistance/phase at 75ºC (i) HV (ii) LV (i) Height of HV coil (j) Wire used for delta formation:- (i) Material (ii) Diameter (Min 1.5 time of the dia of HV winding wire)	--- Electrolytic copper ---			
13	Fixed losses at normal ratio (KW) (Max.)				
14	Load losses at normal ratio at 75°C (KW) (Max.)				
15	Total losses at normal ratio (KW) (Max.)				
16	Tolerance on losses at normal ratio.				
17	Impedance voltage at normal ratio between HV & LV windings at 75°C.				
18	Impulse test level of HV & LV windings at 1.2/50 micro second wave.				
19	**INSULATION OF MATERIAL**:- Insulation material used & its thickness: a) Between core & LV b) Spacers c) Inter layer d) Between HV & LV winding e) Between phases f) End insulation				
20	**CLEARANCES**:- a) LV to Core (Radial) b) Between HV & LV (Radial) c) Phase to phase between HV conductor (with providing min. of 2x1 mm Press Board to cover the rods) d) Between winding & body i) Length wise ii) Breadth wise e) End insulation f) Thickness of locking spacers between HV coils g) Axial wedges between HV & LV coils h) Clearance between : (i) top cover and top of yoke for 63 KVA				

Sl. No.	Particulars	63 KVA	100 KVA	200 KVA	315 KVA
	and 100 KVA transformers. (ii) top cover and top most live part of tap changer for 200 KVA and above i) No. of radial spacers per phase between HV coil g) Size of duct between LV & HV				
21	**TANK** (a) Shape (b) Thickness of tank sheets: (i) Top & Bottom (ii) Side walls (iii) Collar (c)Internal dimension of tank: (i) Length (l) (ii)Breadth (b) (iii)Height (h1) (h2) (Difference between h1 & h2 should be 20mm) (d) Gasket used between top cover and tank (i) Material (ii) Thickness (iii) Type of joint (e) Pulling lugs (i) No. (ii) Thickness (iii) Position of fixing (f) Lifting Lug (i) No. (ii) Thickness (g) Reinforcement of tank sides by providing angle of size 50x50x6mm at one/two places for transformers upto 100 KVA/above 100 KVA, respectively. (h) Dia & thickness of rollers for 200 KVA and Above ratings Transformers.				
22	**BUSHING** : (a) Characteristics: (i) Dry flash over voltage HV LV (ii) Wet flash over voltage HV LV (iii)Impulse flash over voltage HV LV (b) Material of bushing rods				

Sl. No.	Particulars	63 KVA	100 KVA	200 KVA	315 KVA
	(c) Size of bushing rods (d) Mounting on side walls or top cover (e) Whether sheet metal pocket used for mounting HV Bushings (pipe are not acceptable) (f) Bushing clearances (i) Phase to phase HV LV (ii) Phase to earth HV LV (g) Arrangement of studs provided for fixing of HV Bushings should be in diamond shape so that the arcing horns are positioned vertically				
23	**Bimetallic Connectors** (For all ratings) (a) Normal current rating (i) HV (ii) LV (b) Short time current rating for HV & LV (c) Tensile strength for HV & LV both		----50Amps--- ---200Amps---		----50 Amps ---- ---630Amps------- ----------3000 Amps one second------ ----------110 Kg----------
24	**CONSERVATOR**: (a) Dimensions (b) Volume (c) Internal Diameter of pipe used for connecting conservator and tank (d) Please confirm whether pipe projected into the conservator 20 mm above the bottom of conservator				
25	**RADIATORS**: (a) Nos. of Radiator (b) Nos. of fins per radiator (c) Size of fin (d) Position of fixing (i) Nos. on LV side (ii) Nos. on HV side				
26	**Oil to be filled in:-** (a) Grade Characteristics as per Annexure-VI (b) Transformer Tank (i) Volume (ii) Weight		-------- EHV Gr-II -------		

Sl. No.	Particulars	63 KVA	100 KVA	200 KVA	315 KVA
	(c) Conservator (i) Volume (ii) Weight (d) Total oil filled (i) Volume (ii) Weight				
27	**Overall dimension of Transformer**: (a) Length (b) Breadth (c) Height				
28	**Engraving of Sl. No. & name of firm** : (a) On bottom or core clamping channel (b) On Side wall & top cover of tank (c) Date of dispatch on the Tank.				
29	MS Plate of size 125x125mm welded on side wall stiffener of tank with engraving of : i) Name of the firm ii) Rating iii) Serial Number iv) Order No. & date v) Date of despatch vi) Name of Inspecting Offer vii) Designation.				
30	Weight of windings only. a) HV b) LV				
31	Weight of core & winding assembly				
32	Un-tanking weight of core & winding (including oil absorption)-				
33	Weight of tank & fittings including radiators				
34	Weight of complete transformer including fittings & oil [Sl.No. 31 + 33 + 26 d(ii)]				
35	Colour of transformer Conservator tank Main tank & radiator	------ While------ ------Green-------			
36	Reference of type test reports: (a) Short circuit test Report no.& date (b) Impulse test Report no. & date.				
37	Top cover and side walls of the transformer tanks should be welded with "U" clamps on four corners and centre of both length sides.				
38	Whether tap range of off load tap changer is from (+)3 % to (-) 9% in steps of 3% on HV side for HV radiator on 200 & 315 KVA transformers.				

REMARKS :

1. Firm should furnish type test reports of the transformer manufactured as per Technical Specifications.
2. The proforma should be filled up for the type tested design and submitted within 10 days positively along with drawings for approval.

Signature of Representative of the firm with seal
Name:-
Designation:

ANNEXURE-I

GENERAL TERMS & CONDITIONS OF SUPPLY OF DISTRIBUTION TRANSFORMERS

1. **TERMS OF PAYMENT**:-

i) 100% payment along with Excise Duty and taxes shall be made within 30 (thirty) days from the date of receipt of material at area stores in good condition against **Material Receipt Certificate (MRC)** issued by he consignee. On production of necessary documents to the Dy. Director (Bills) O/o CMD, M.P. Poorv Kshsetra V.V. Co. Ltd., Jabalpur. **The Discom-EZ shall not be liable for payment of any interest on delayed payment.**

ii) The following documents will have to be forwarded to the paying authority along with bills in triplicate :-

(a) A copy of bill
(b) Delivery challan.
(c) Copy of despatch instructions/advise.
(d) Proof regarding payment of Excise Duty.

iii) The original bills should be forwarded to the paying authority and should be marked 'ORIGINAL'. The bill should indicate the Sales Tax registration No. & date allotted to him under the Sales Tax Act.

iv) The Material Receipt Certificate will be forwarded by the consignee to the paying authority for payment as well as to the supplier towards acknowledgement of receipt of material, including part consignment, to the extent, it is received in good condition and is serviceable. Further, a copy of all the documents shall also be forwarded to this office.

v) However, if the supply is delayed due to pending payments, delivery extension will be given without levy of penalty and with Price Variation to the extent of delay in payments.

2. **PAYMENT OF STATUTORY LEVIES:**

(i) **Excise Duty** :- Excise Duty shall be paid only on ex-works price and shall be re-imbursed at actuals against documentary evidence. The evidence of payment of Excise Duty shall be submitted while claiming payment of the same.

(ii) **Central Sales Tax (CST)/Value Added Tax (VAT)**: - M.P. Poorv Kshetra Vidyut Vitaran Company Ltd., Jabalpur is a Registered Dealer and TIN Number is 23845807718.

The concessional rate of Sales Tax shall be applicable against the declaration form No. "**A3**" for MPCT and "C" for CST, as the case may be, which will be issued by this office after receipt of material.

(iii) The payment of statutory levies such as Excise Duty / CST/ VAT against the contract shall be made at the rate prevailing during the contractual delivery period only subject to the provision of purchase order and for the quantity actually delivered during the contractual delivery period.

(iv) In case supplies against the contract are effected late i.e. beyond contractual delivery period and rate of Excise Duty / CST / VAT undergoes upward revision, the payment will continue to be made only on the basis of rates prevailing subject to the provision of purchase order during the contractual delivery period. However, in case the rate of statutory levy (s) undergoes, downwards revision than the delayed supplies beyond contractual delivery period will attract reduced rate of statutory levy (s).

3. **PRICE VARIATION:-**

Price Variation shall be allowed on ex-works price as shown in Price Schedule-I only as per IEEMA Price Variation formula (revised) as shown in Annexures enclosed, without ceiling with basic prices ruling as on first working day of the month, one month prior to the date of opening of tender. The price increase will be limited to contractual delivery period only.

In case the actual supplies are made beyond the contractual delivery period, the price prevailing at the time of contractual delivery period or actual date of supply, whichever is less, shall be taken.

4. **PENALTY**:

The time for and the date of delivery of the material stipulated in the order shall be deemed to be the essence of the contract. In case of delay in execution or non-execution of the order, the MPPKVV Co. Ltd at its option shall recover from the supplier/contractor as agreed towards liquidated damages a sum of Half Percent (1/2%) of the FOR destination price (landed cost) of any stores not delivered per week or part thereof subject to maximum 10%, subject to force majeure condition supported by documentary evidence.

For the purpose of penalty, the date of offer of material in the office of Chief Engineer (S&P-EZ), MPPKVV Co. Ltd., Jabalpur, shall be considered as the date of delivery subject to the condition that offer has been made 15 (fifteen) days in advance of terminal date of scheduled delivery and material is delivered at stores within 21 days from the date of issue of despatch instructions.

For early inspections, offer may be sent telegraphically or by telex/fax. MPPKVV Co. Ltd. will not be responsible for delays for ordinary/registered post for inspection offers. Please note in case material is not received within 21 days from the date of issue of despatch instructions, even though the delivery period exists, penalty shall be reckoned from the original delivery period and the period of 21 days allowed for despatch shall not be permitted and shall be taken into account for calculation of penalty.

5. **SECURITY DEPOSIT**:

5.1 On acceptance of offer, the supplier will have to deposit an amount of 10% of the total value of the order in cash or Demand Draft or Bank Guarantee as Security Deposit.

5.2 Cash to be deposited with office of Regional Accounts officer (JC) MPPKVVCL, Jabalpur and original receipt produced to this office shall be returned after conveying the acceptance of Security Deposit.

5.3 Demand Draft to be drawn in favour of Sr. A.O., (JC), MPPKVVCL, Jabalpur drawn on any nationalized/scheduled Bank and payable at Jabalpur.

5.4 Bank Guarantee in lieu of cash deposit on any nationalized/ scheduled bank strictly as per Board/Company's/Board's proforma (to be supplied along with the order) valid sufficiently to cover the guarantee period.

5.5 All SSI Units registered with Industries Department of MP shall be required to pay Security Deposit for only 5% (five percent) value of the order, subject to maximum of Rs.20,000/- in cash or DD. This concession is for such SSI Units of M.P. who are doing business up to Rs.50 Lacs annually only.

5.6 The Security Deposit shall have to be deposited within 30 days of issue of order.

5.7 The Discom-EZ shall forfeit the security deposit in the event of non-execution/ part execution of the orders/poor performance of supplier/contractor besides invoking the Penalty Clauses.

5.8 The Security deposit shall be returned to the successful bidder only after due and faithful performance of the order as per terms and conditions of the order and on expiry of guarantee period provided there are no claims outstanding to be recovered against the bidders/ suppliers.

5.9 No interest shall be paid by the Discom-EZ on security deposit furnished by the suppliers.

6. **PACKING AND FORWARDING**:

(a) The supplier shall be responsible for the stores being sufficiently and properly packed at his expense for transport by rail/road/sea so as to ensure them being free from loss / damages or injury, due to handling and transport to the destination.

(b) In case of any loss or damage to the consignment at the time of delivery, the same shall be made good free of all charges to the purchaser by the supplier.

7. **TRANSIT RISK** :

a) Responsibility regarding covering of risks, during transit of material, shall entirely be on the tenderer. MPPKVV Co. Ltd., shall in any case, not bear the transit risks / transit insurance charges.

b) Transit damages/shortages/losses shall be reported by the consignee within 30 days from the date of receipt of consignments. Such damages/shortages/losses shall be repaired/replaced by the supplier free of cost within one month from the date of intimation by the consignee without awaiting for the settlement from carrier or Insurance Co. etc. If the supplier fails to do so the consignee(s) shall be free to get the repair work done from other sources and they shall be free to recover the cost of such material/expenses of repairs either from the supplier's balance bills or from the security deposit, as deemed fit.

c) While the necessary assistance shall be rendered by the consignee in lodging and processing of the claims with carriers and the supplier's insurance under-writers, the

responsibility shall rest with the supplier to immediately make good the shortages/losses/damages without any extra cost and without waiting for the settlement of the claim.

d) Replacement of goods lost/broken or damaged including loss due to fire:

Notwithstanding anything herein contained, the supplier shall undertake responsibility for the safe arrival of material in good condition and without any loss or damage at the final destination and until the same is actually delivered to/received by the MPPKVV Co. Ltd. at its Stores or other places of final destinations. For this purpose material carried by Railway or Road transport or other carriers shall be deemed to be so carried at the risk of the supplier. In case of transport damages/shortages, the payment shall be made only for the quantity received in good and working condition and consignee shall lodge claim with the supplier/carrier with all necessary documents for settlement of the same with the carriers at supplier's end.

8. **MODE OF DESPATCH :**

The dispatches shall be made by Road Transport freight paid and consigned as per the despatch instructions which will be sent separately while communicating the decisions regarding pre-delivery inspection of the lot offered.

If the material is offered within the delivery schedule period and dispatched after expiry of the period because of delay in arranging inspection or issue of despatch instructions from Company's side, the date of offer of material shall be reckoned as date of delivery provided the material is delivered within 21 days from the date of issue of despatch instructions for the particular lot for the purpose of calculation of penalty.

In case of transformers damaged during transportation, the date of receipt of consignment shall be considered for the purpose of working out delay in supply and calculation of penalty thereof, provided the supplies made are within the contractual delivery period.

9. **PERFORMANCE GUARANTEE** :

(i) If during the course of 36 months subsequent to the date of despatch of consignment, any of the goods found to be defective in materials or workmanship or develops defects during service, they will have to be replaced / repaired by the suppliers free of all charges. All necessary arrangements on this account will be made by the suppliers.

(ii) The said material if required to be replaced / repaired, shall be collected by the supplier / firm from Area Stores / Works site at their own cost and at their own responsibility. These material will like-wise be returned duly repaired / replaced and tested subsequently by the supplier to the destination indicated on freight paid basis at their cost in a reasonable time of 90 days from the date of intimation by the Area Stores.

(iii) Unit once failed within guarantee period and returned to Area Stores duly repaired free of charges, shall be guaranteed for a minimum of 12 months or un-expired guarantee period left as on the date of failure of the unit, whichever is later.

(iv) In case unit is subsequently failed within 12 months and the total period of service given by the unit is more than 24 months but less than 36 months, then unit shall has to be repaired again free of charges, by the supplier. In case the unit further fails within 12 months of its last return duly

repaired, then the unit shall be repaired again free of charges by the supplier but the guarantee for the repaired unit, in this case, shall be for the un-expired period out of 12 months.

(v) The outage period i.e. period from the date of failure till unit is repaired, shall not be counted for arriving at the guarantee period of 36 months. The period of failure and repairs, thus, shall be excluded from the guaranteed service of 36 months.

(vi) Further, it is clarified that all the charges towards carrying out repairs including packing / forwarding, loading / unloading shall be borne by the supplier. The amount deposited under security deposit clause shall also cover the performance guarantee of repaired / replaced units.

(vii) The actual cost of dismantling and replacement of the equipments with new one may be charged to the supplier's account.

(viii) To & fro transportation cost of such failed equipments shall be borne by the supplier.

(ix) In the event of the supplier's inability to adhere to the aforesaid provisions, suitable penal action will be taken against them which may inter-alia include black listing of the firm for future business with the Company for a certain period.

10. **RANDOM TESTING:**

(i) Inspection of material before despatch or waiver of inspection will, however, not relieve, the supplier from his responsibility to supply the material strictly in accordance with the specification. The MPPKVV Co. Ltd shall have option to test the samples selected at random from the lot received in Area Stores and shall be subjected to routine testing as per IS:1180 and 2026 (with latest amendments) at MTRU, Jabalpur/ CPRI, Bhopal, CPRI, Bangalore/ERDA, Vadodara/any reputed Govt. Laboratory.

(ii) It is only after the results of randomly selected transfers are found satisfactorily, the MRC shall be issued and the transformers of the lot shall be accepted / issued to field units.

(iii) Serial number, name of the inspecting officer and his designation shall have to be embossed by the manufacturer on the tank of every transformer.

(**B**) In case of emergency, the transformers are issued in the field before obtaining the test results from the Laboratory and in the event of failure of any transformer in any/all routine tests later on, the following action shall be taken for that particular lot / order only:-

(i) 5% payment of the bill for the supplies already made will be recovered by Discom-EZ.

(ii) For transformers already supplied, the guarantee period shall stand twice the normal guarantee period and the period of performance security deposit shall be suitably extended to cover the extended guarantee period.

(iii) The supplier shall be intimated about the results of such test to make suitable improvement in his manufacturing process and to ensure quality control.

(iv) If any transformers are available in the area stores, these shall have to be replaced by the manufacturer at his own cost.

(v) One unit of each capacity from the next lot shall be sent to the identified laboratory for carrying out routine tests. In case the transformer fails again in any or all routine test, no further supply shall be accepted and the transformers available at area stores supplied against the current order shall have to be taken back by the manufacturer at his own cost.

(vi) The manufacturer will have to carry out suitable improvement in the design of the transformer and get it type tested in presence of Company's representative at his own cost. It is only after the transformer successfully passes the type test, the supplies shall be resumed. Further, the penalty towards delayed supplies shall be to manufacturer's account (if any).

11. **EMBOSSING OF SERIAL NUMBER AND NAME OF FIRM:**

Each transformer against the order has to be distinctly marked and numbered at two points, one on the side of the tank and the other at the bottom of clamping channel of the active portion (core-coil assembly). The marking should indicate the make and serial number of transformer. This should be suitably embossed by punching so as to have lasting impression.

Further, MS plate of size 125x125mm be got welded on width side of transformer on stifner angle. On this plate, Name of firm, order no. & date, Serial Number, Rating of Transformer, Name of inspecting officer & his designation and Date of Despatch should be engraved in moderate size of letters..

12. **INSPECTION AND TEST CERTIFICATE:**

i) Each lot of offered material shall be inspected by the Company's inspecting officer normally at two times, firstly at the time of manufacturing (termed as stage inspection) and secondly before despatch (termed as pre-despatch/Final inspection The supplier shall extend all reasonable and necessary help to the inspecting officer of the Company to carry out testing of material at his works.

ii) An intimation about the date, by which material shall be ready for inspection, indicating quantity, shall be given to SE(S&P), MPPKVV Co. Ltd., Jabalpur by the tenderer only, so as to reach him sufficiently in advance, failing which, the suppliers shall be responsible for delay in delivery on account of inspection. On receipt of such intimation, the material shall be inspected normally within 15 days.

iii) The supplier shall not despatch the materials unless and until test certificates/reports are approved and specific despatch instructions are issued duly verified by the office of Chief Engineer (S&Pe-EZ), MPPKVV Co. Ltd., Jabalpur or authorized officer of the Company.

iv) In case the inspecting officer deputed for inspection does not find the offered lot ready, the Company reserves the right to recover from the supplier, such charges as may have been incurred towards arranging such inspection. The charges have been mentioned in Clause – **FAKE INSPECTION CALL** below.

13. **RIGHT TO CARRYOUT THE INSPECTION DURING MANUFACTURING:**

i) The Company, at its option, will inspect the material on order during its process of manufacturing including the inspection of raw material and will request the supplier to carry out such tests as may be necessary to ensure proper quality check. Samples of components of the material shall be subjected to quality check by the inspecting officer during manufacturing. In the event of stage inspection, if any discrepancy is noticed, the supplier shall be given immediate notice to suspend further manufacturing until corrective measures are taken and the process cleared.

ii) **Factory inspection** :

During the pendency of the order the factory inspection may be conducted by Company's authorized officers as and when felt necessary for ensuring production of quality material.

iii) The supplier/sub-supplier shall extend all reasonable and necessary assistance to the inspecting officer of the Company to carry-out testing of equipment/material at his work.

14. **FAKE INSPECTION CALL:**

All such firms, who after giving inspection call, do not offer material to the Inspecting Officer for inspection due to one or the other reasons, shall be required to remit a sum of Rs.5,000/- per Officer.

15. **FORCE MAJEURE** :

The supplier shall not be liable for delay in performing his obligations resulting directly from any force majeure as here in defined :-

(a) Natural phenomena, such as floods, draughts, earthquakes and epidemics.
(b) Act of any Government Authority, domestic or foreign, such as war declared or undeclared, quarantines, embargoes, licensing control or production or distribution restrictions etc.
(c) Accident and disruptions such as fires, explosions, increase in power cut with respect to date of tender opening, break down of essential machinery or equipments etc.
(d) Strikes, slow down, lockouts continuing for more than three (3) weeks.
(e) Failure or delay in the supplier's source of supply due to force majeure causes enumerated at (a) to (d) above, provided the supplier produces documentary evidence to show that there were no other alternative sources of supply available to him, or if available, the lead time required was likely to be longer than the duration of the Force Majeure at the normal source of supply.

(f) Any cause which is beyond the reasonable control of the supplier or purchaser, as the case may be.

All the provisions of this clause shall apply whether the disrupting cause is total or partial in its effect upon the ability of the supplier to perform.

NOTE : The cause of force majeure condition will be taken into consideration only if the supplier within 15 days from the occurrence of such delay notifies. The Company shall verify the facts and grant such extensions as the facts justify. For extension due to force majeure conditions, the supplier shall submit his representation with full documentary evidence for scrutiny by the purchaser and decision of the Company shall be binding on the firm. However, no variation towards prices and any other statutory levies will be payable.

16. **MATERIAL TEST CERTIFICATE :**

Each item of the lot should be tested by the supplier and routine test certificate in duplicable giving the result of all tests prescribed in the relevant ISS (as also mentioned in the Technical Specifications), for ordered items shall be submitted to the office of the C.E.(S&P-EZ), MPPKVV Co. Ltd., Jabalpur, for approval before offering the lot for inspection. Please note that each lot of distribution transformer will be inspected at your works and at the works of your sub-supplier of other equipments, which includes witnessing of all tests prescribed in ISS.

17. **RECOVERIES FOR LIABILITIES AGAINST OTHER CONTRACTS :**

All amount recoverable from the successful tenderers against earlier contracts along with their sister concern will be adjusted from payment, due against the contract that may be awarded under this specification.

18. **CANCELLATION OF ORDER**:

(i) The Company may upon written notice of default, terminate contract in the circumstances detailed hereunder:-

(a) If in the opinion of the Company, supplier fails to complete the contract within the time specified or during the period for which extension has been granted by the Company.

(b) If in the opinion of the Company, the supplier fails to comply with any of the other provisions of this contract or materials are found not in accordance with prescribed specifications and or the approved samples.

(c) If as a result of inspection at any stage it is revealed that material and /or, workmanship is substandard which is likely to effect the performance of the finished product, a notice would be served by the Company to the supplier to suspend further activities and to take urgent steps towards corrective measures, failing which the entire order would be cancelled.

(ii) In the event of such termination, the Company shall exercise its discretionary power either:-

a) To recover from the supplier the agreed liquidated damages as specified in the **PENALTY CLAUSE** above.

OR

b) To purchase from elsewhere after giving due notice to the supplier on account and at the risk of the supplier such stores/material not so delivered or others of similar description without canceling the contract in respect of consignment not yet delivered.

c) To cancel the contract reserving Company 's right to recover damages.

(iii) Notwithstanding that the power under clause (ii) a,b,c, referred to above, are in addition to the rights and remedy available to the Company under the general law of India relating to contract.

(iv) In the event of risk purchase of stores of similar description, the opinion of the Company shall be final. In the event of action taken under (ii) a or b above, the supplier shall be liable to pay for any loss which the Company may sustain on that account but the supplier shall not be entitled to any saving on such purchases made against the default.

(v) The decision of the Company shall be final regarding the acceptability of the stores supplied by supplier and Company shall not be required to give any reason in writing or otherwise at any time for the rejection the stores materials.

(vi) In the event, Company does not terminate the order as provided in clause (i) & (ii) above, the supplier shall continue execution of this order, in which case he shall be liable to the Company for liquidated damages for the delay as set out in clause- 4 until supplies are accepted.

19. **EXTENSION ORDER**:

The Discom-EZ reserves right to place an extension order for any additional quantity to the extent of 100% quantity of the original order on the same rates, terms and conditions within six months from the date of order.

20. **ARBITRATION:**

If, at any time, any question, dispute or difference, whatsoever shall arise between the purchaser and the supplier, upon, or in relation to or in relation with the contract either party may forthwith give to the other, notice in writing of the existence of such questions, dispute or difference and the same shall be referred to the adjudication of two Arbitrators, one to be nominated by the purchaser and the other to be nominated by the supplier or in case of said Arbitrators not agreeing, then to the adjudication of the Umpire to be appointed by the Arbitrators, whose decision shall be final and binding on the parties and the provision of Indian Arbitration Act, 1940, and of the rules there-under and any statutory modification thereof shall be deemed to apply. The Arbitrators or the Umpire, as the case may be, are bounded to give a detailed speaking award assigning reasons for the findings.

The suppliers under the contract shall be continued by the contractor during the arbitration proceedings, unless otherwise, directed in writing by the purchaser or unless the

matter is such that the work can not possibly be continued until the decision of the Arbitrators or the Umpire, as the case may be is issued.

21. **JURISDICTION:**

Any dispute or difference, arising under, out of or in connection with this tender/contract shall be subject to exclusive jurisdiction of competent court at Jabalpur only.

22. **VARIATION IN THE ORDERED QUANTITY:**

A tolerance in the ordered quantity may be allowed to the extent of ± 2% (plus minus 2%) and not for each consignment. MRCs shall be issued only for actual receipt of quantity.

23**.** **SUBMISSION OF DESPATCH DETAILS**

On completion of supplies, a statement showing details of offer and supplies made shall be furnished to this office promptly i.e. in first week of following month in following proforma:-

Page 1

S.No.	Particulars	Qty. offered	Date of offer	Date of D.I.
1	2	3	4	5

Page 2

Qty. for which D.I. is given	Bill No. & Date	Qty. Supplied	Name of Consignee
6	7	8	9

Page 3

Liability intimated by consignee	Details of remittance of liability	Addl. information, if any	Remarks
10	11	12	13

Similar information for supplies made during each month shall be submitted by the first week of subsequent month.

24. **CORRESPONDENCE:**

A copy of all correspondences on the subject shall be sent to the Dy. Director (Bills-EZ), MPPKVVCL, Jabalpur, the concerned consignees, the concerned Sr. Accounts Officer/ Regional Accounts Officer & to this office.

Chief Engineer (S&P-EZ)
MPPKVVCL : Jabalpur

ANNEXURE- II

DETAILED SPECIFICATION AND TECHNICAL PARTICULARS FOR DISTRIBUTION TRANSFORMERS

1. **SCOPE** :- The specification covers the design, manufacture testing and inspection before despatch and delivery at any of the Area Stores of Discom-EZ listed in **Annexure-VIII.**

The specification covers Oil immersed, Naturally Air cooled (type ONAN), outdoor type, three phase, 50 Hz, 11/.433 KV step down distribution transformers of capacities 63, 100, 200 & 315 KVA. Transformers should be suitable for service under frequency fluctuation of ± 4% and voltage fluctuation + 10% / -25% on HV side. The full load rated current on HV & LV side of each rating of transformers shall be as under:-

S. No.	RATING IN KVA	RATED FULL LOAD CURRENT (IN AMPS)	
1	63	3.31	84.00
2	100	5.25	133.33
3	200	10.5	266.67
4	315	16.53	420.00

2. **APPLICABLE STANDARDS** :- (A) Unless otherwise modified in the specification, the transformers shall comply with the requirement of ISS:1180(latest issue) 2026 (latest issue) and REC Specification 2/1978 and ISS:2099 (latest issue). The bushings used shall conform to ISS:2099 & 3347 (latest issue) except as modified herein.

(B) **Type**: i) The transformers shall be double wound, three phase oil immersed, oil Natural Air Natural cooled (type 'ONAN'), core type suitable for outdoor installation in tropical climate and shall be insulated with DPC insulation on HV & LV windings. Insulation should be of temperature class as per the temperature rise stipulated in this specification.

ii) The neutral point of the secondary (LV winding) is intended for solidly earthed system and should be brought out to a separate insulated terminal, enabling external insertion of a current transformer in the earth lead to be connected wherever required.

(C) **Climatic Conditions:**

(i)	Peak outdoor temperature	50^{o}C. Minimum (50^{o} C + 50^{o} C)
(ii)	Maximum Oil temperature	95^{o}C (50^{o}C + 45^{o} C) Under Max. temperature, Max. load conditions attainable.
(iii)	Maximum relative humidity	95% (sometime approaches saturation point).
(iv)	Minimum relative humidity	10%
(v)	Average No. of thunder storm days per annum.	40 days
(vi)	Average number of rainy days per annum.	90 days
(vii)	Number of months of tropical monsoon conditions.	3 Months
(viii)	Average annual rainfall	125 Cms
(ix)	Wind pressure	100 Kg/m^2
(x)	Altitudes not exceeding	1000 Meters

3.0 **RATINGS:**

Primary voltage - 11 KV
Secondary voltage - 0.433 KV

The windings of the transformers shall be connected in delta on primary side and star on the secondary side. The neutral of the LT winding shall be brought out to a separate terminal. The vector group shall be Dyn-11.

4.0 **OVER LOAD CAPACITY** :

The transformers shall be suitable for over-load capacity as per IS: 6600 (latest amendment).

5.0 **TEMPERATURE RISE** :-

Temperature rise for top oil over an ambient of 50^{o} C should be 45^{o} C max. (measured by thermometer as per IS-2026). Temperature rise for windings over an ambient of 50^{o} C should be 50^{o} C max. (measured by resistance in accordance with IS: 2026)

6.0 **NO LOAD VOLTAGE RATING**:

The No Load Voltage ratio shall be 11000/433-250 Volts for all capacities.

7.0 **TAPS** :

No tapping shall be provided for transformers upto 100 KVA rating. For ratings 200 KVA to 315 KVA, tapping shall be provided on the higher voltage winding for variation of HV voltage within range of + 3% to (-) 9% in the steps of 3%.

Tap changing shall be carried out by means of an externally operated self position switch and when the transformer is in de-energized condition. Switch position No.1 shall correspond to the maximum plus tapping. Each tap change shall result in variation of 3% in voltage. Provision shall be made for locking the taping switch handle in position. Suitable Aluminium anodized plate shall be fixed for tap changing switch to know the position No. of tap.

8.0 **DESIGN AND CONSTRUCTION** :

CORE :

(a) **Material** :- CRGO Sheet

(b) The core shall be of high grade cold rolled grain oriented annealed steel laminations having low loss and good grain properties, coated with hot oil proof insulation, bolted together and to the frames firmly to prevent vibration or noise. All core clamping bolts shall be effectively insulated by zinc chromate and paper. The complete design of core must ensure permanency of the core losses with continuous working of the transformers. The value of the flux density allowed in the design and grade of lamination used shall be clearly stated.

(c) The transformer core shall not be saturated for any value of V/f ratio to the extent of 112.5% of the rated value of V/f ratio(i.e. 11 KV/50 due to combined effect of voltage and frequency) upto 12.5% on any tapping without injuries heating at full load condition and should not get saturated. The supplier shall furnish necessary design data in support of this situation.

(d) **Flux Density** :- Flux density at rated voltage and frequency shall not exceed 1.55 Webbers per sq. meter. No load current at rated voltage and at 112.5% of rated voltage shall not exceed the values given below:-

RATING IN KVA	**PERCENTAGE OF RATED FULL LOAD CURRENT**	
	100% OF RATED VOLTAGE	**112.5% OF RATED VOLTAGE**
63	3.0	6.0
100	2.5	5.0
200	2.0	4.0
315	2.0	4.0

Test for magnetic balance by connecting the LV phase by phase to rated phase voltage and measurement of an, bn, cn voltages will be carried out.

(e) **Details of Core :**

S. No.	PARTICULARS	UNIT	RATING IN KVA			
			63	**100**	**200**	**315**
1.	No. of steps (Min.)	No.	5	5	7	7
2.	Dia. of Core (Min.)	mm	100	115	155	170
3.	Effective Core Area	Cm^2	70	92	160	200
4.	Core Clamping:					
a.	Channel	mm x mm	75x40	75x40	100x50	125x65
b.	Core Bolt (High Tensile) Dia. / Nos.	mm / Nos.	12 / 2 at each end	12 /2 at each end	16 /2 in parallel	16 /2 in parallel
c.	Tie Bolts of MS Rod Dia. / Nos.	mm / Nos.	12 / 4	12 / 4	16 / 8	16 / 8
d.	Core Bolts & Tie Rods to be painted with Zinc Chromate PAINT and effectively insulated					
e.	Top & bottom yoke should be constructed in single piece of CRGO laminations.					
f.	The top yoke channels to be reinforced by MS Flat of 50x6 mm at equal distance, if holes cutting are done for LT Lead so as to avoid bending of channel.					
g.	Core Base and bottom yoke shall be supported with 75x40 mm MS channel properly bolted together. In no case, Flat or cut channels shall be accepted.					
h.	All channels, top and bottom yoke Nut Bolts, Tie rods shall be painted with oil and corrosion resistant Zinc Chromate paint before use.					
i.	Core should be properly earthed through copper strip. One end of copper strip should be inserted deeply into core laminations and other end bolted with the core clamping channel.					

9.0 **WINDINGS** :

a) **Materials**:- Double paper cover Aluminium Conductor shall be used for ratings upto 200 KVA. For ratings above 200 KVA double paper covered electrolytic copper shall be used.

b) **Current Density** for HV & LV should not be more than 2.8 A/sq. mm. for copper and 1.6 Ampere per sq. mm. for Aluminium Conductor.

c) **HV Cross section** shall not be less than;-

i) 63 KVA - 1.39 SQMM.
ii) 100 KVA - 2.27 SQMM.
iii) 200 KVA - 3.79 SQMM.
iv) 315 KVA - 3.40 SQMM.

d) **LV Cross section** shall not be less than:-

i) 63 KVA - 52.5 SQMM.
ii) 100 KVA - 86.0 SQMM.
iii) 200 KVA - 168.0 SQMM.
iv) 315 KVA - 156.0 SQMM.

NOTE : LV Winding shall be in even layers so that the neutral formation will be at top.

e) HV winding resistance at room temperature 20 ^oC with 5% tolerance should not be more than:

i) 200 KVA - 14.52 Ohms.
ii) 315 KVA - 7.07 Ohms.

f) LV winding resistance at room temperature 20 ^oC with 5% tolerance should not be more than:

i) 200 KVA - 0.00456 Ohms.
ii) 315 KVA - 0.00278 Ohms.

10.0 **LOSSES AND IMPEDENCE :**

The losses and impedance for various ratings of transformers should be as shown below subject to tolerance as per I.S.:1180 & 2026 and shall be calculated at 75^o C as per limits specified. For 63 to 100 KVA no tolerance shall be permissible on No Load and Load losses.

S. No.	RATING IN KVA	NO LOAD LOSS AT 75°C	LOAD LOSS AT 75° C	IMPEDANCE (%)
1	63	180	1235	4.5
2	100	260	1760	4.5
3	200	500	3000	5.0
4	315	580	4200	5.0

11.0 **INSULATION MATERIAL AND CLEARANCES :**

(a) **Materials** :- Electrical grade insulating craft paper of triveni/ Ballarpur or equivalent make subject to approval of the purchaser. Press board of Senapaty, white lay or Raman make or equivalent subject to approval of purchaser. Perma wood or Haldi wood blocks shall be used for top and bottom yoke insulation.

(b) **Radial clearance** of LV coil to core (bare conductor) shall not be less then :-

i) 63 KVA - 3.5 mm
ii) 100 KVA - 4.0 mm
iii) 200 KVA - 4.0 mm
iv) 315 KVA - 4.5 mm

(c) Radial clearance between HV & LV shall not be less than 11 mm for ratings 63 KVA to 315 KVA.

(d) Phase to phase clearance between HV conductor shall not be less then 10 mm with the minimum of 2x1 mm press board to cover the Tie rods.

(e) The minimum electrical clearance between the winding and body of the tank (between inside surface of the tank and outside edge of the windings)should be 30 mm.

(f) Minimum end insulation to earth shall be 25 mm.

(g) No. of coils HV/phase(minimum) :
(i) For 63 & 100 KVA - 4 Nos.
(ii) For 200 & 315 KVA - 6 Nos.

(h) Thickness of locking spacers between HV coils- 10 mm (Minimum)

(i) No. of axial wedges between LV and HV winding equi-spaced around L.V.-
- 6 for 63 KVA,
- 8 for 100 & 200 KVA
- 12 for 315 KVA.

(j) Minimum external clearances of Bushing terminals :

	Phase to Phase	Phase to earth
HV -	255 mm	140 mm
LV -	75 mm	40 mm

12.0 **TANK**:- The transformers tank shall be of robust construction and shall be built of electrically welded M.S. Plates. All joints of tank and fittings shall be oil tight and no bulging shall occur during service. The tank design shall be such that the core and windings can be lifted freely. The tank plate shall be of such strength that the complete transformer when filled with oil may be lifted easily by means of the lifting lugs provided. Tank inside shall be painted by varnish/zinc chromate. Top cover shall be slightly sloping (difference of heights should be 20 mm + 10%) towards H.V. bushing and cover the top with end walls. Shape of the tank shall be rectangular only. No other shape will be accepted.

The tank shall be fabricated by welding at corners. No Horizontal or vertical joints in tank side and its bottom or top cover will be allowed.

(a) (i) Side wall plate thickness : 3.15 mm Upto 100 KVA
4.0 mm Above 100 KVA

(ii) Top and bottom plate thickness. : 5.00 mm Upto 100 KVA
6.00 mm Above 100 KVA

(b) Reinforced by welded angle of size 50x50x6 mm on all the outside walls on the edge of tank to form two equal compartments in case of transformers upto 100 KVA rating and three equal compartments for above 100 KVA rating. One face of reinforcement angle should be continuous welded with the tank surface such that other side of the angle forms inverted "L". The permanent deflection is not more than 5 mm up to 750 mm. length & 6 mm. up to 1250 mm. length, when transformers tank without oil is subjected to a vacuum of 760 mm. of mercury.

(c) **Lifting lugs** : 2 Nos. welded heavy duty lifting lugs of M.S. Plate 8 mm. thick suitably reinforced by vertical supporting flat welded edgewise below the lug on the side wall, upto the reinforcing angle, for transformers upto 100 KVA rating. For transformers of 200 KVA rating and above No. of such lugs should be 4.

(d) **Pulling Lug** : 4 Nos. of welded heavy duty pulling lugs of M.S. Plates of 8 mm. thick shall be provided on width side to pull the transformers horizontally upto 100 KVA and on length side for above 100 KVA.

(e) **Top cover Gasket & Bolts**:
(i) The **Gasket** provided in between Top Cover Plate and Tank shall be of 5 mm. and 6 mm thick Neoprene Rubberized Cork sheets confirming to IS: 4352, Part -II for ratings upto 100 KVA and above 100 KVA respectively.

(ii) **G.I. Nut Bolts** shall be of size 3/8" X 1.5" with one plain and one spring washer suitably spaced to press the cover for ratings upto 100 KVA. For ratings above 100 KVA GI Nut Bolts of 1/2" dia with one plain washer shall be used for top cover fixing spaced at 4" apart.

(iii) The **height of the tank** shall be such that the minimum clear height upto the Top Cover Plate of 120 mm. is achieved from Top Yoke in case of transformers upto 100 KVA. The above clearance is achieved from the live part of the tap changer in case of transformers above 100 KVA.

13.0 (a) **Heat dissipation** by tank walls excluding top and bottom should be - 500 W\m2.

(b) Heat Dissipation by fin type radiator made of 1.25 mm thick MS sheet, will be worked out on the basis of manufacturers data sheet. Supplier should submit the calculation sheet.

(c) For 63 and 100 KVA transformer, 2 Nos. Radiators shall be provided only on LV Side and shall be of fin type. They should be fixed at right angle to the sides and not diagonally for transformers, above 100 KVA radiators shall be provided on both sides.

(d) Arrangement for studs provided for fixing of HV bushings should be in diamond shape so that the arcing horns are positioned vertically.

14.0 **TOTAL MINIMUM OIL VOLUME** :

Sl No.	RATING IN KVA	OIL IN LITERS (Inclusive of Oil absorption in Core-Coil Assembly)	PERMISSIBLE OIL ABSORPTION IN LITERS
1.	63	155	6
2.	100	190	7
3.	200	400	15
4.	315	500	19

NOTE: If the absorption of oil in core and winding Assembly is more than permissible value, first filling of oil volume should be increased accordingly. Detail calculation of absorption should be submitted.

15.0 **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. Dimension of the conservator shall be indicated in General arrangement drawing.

(b) **Diecast Metal Oil level indicator** shall be provided on the side which will be with fully covered detachable flange with single gasket and tightened with M.S. Nut -Bolt and will be fixed on the side of rating plate and drain valve.

(c) The **pipe** from the conservator tank connecting to main tank shall be of 30 mm internal dia and shall have a slopping plate so that the oil falling from the pipe shall not fall directly on the active job and shall fall on the side walls only. The pipe should project in the conservator so that its end is approximately 20 mm above the bottom of the conservator. Thus slopping plate should be fitted such that clearance from the yoke/live part of the tap changer is maintained as prescribed i.e. 120 mm.

The conservator shall be provided with the drain plug and a filling hole, with cover. In addition, the cover of the main tank shall be provided with an air release plug.

16.0 **Breather**: Breather joints will be screwed type. It shall have die-cast Aluminium body. Make of breathers shall be subject to purchaser's approval. Volume of breather shall be suitable for **500 gm.** of silica gel for transformers **upto 200 KVA** and **1 Kg**. for transformers **above 200 KVA**.

17.0 **TERMINALS:**

(a) Brass rods 12 mm dia for H.T. and L.T. with necessary Nuts, check nuts and plain thick tinned washers of brass for ratings upto 100 KVA.

(b) For ratings above 100 KVA:

(i) Brass rods 12 mm dia for H.T. with necessary nuts, check nuts and plain thick brass washers.

(ii) Tinned copper rods 20 mm dia for 200 and 315 KVA and 30 mm dia for 500 KVA transformers with necessary nuts, check nuts and plain thick tinned copper washer for LT.

(c) H.T.\ L.T. bimetallic connectors shall be provided with transformers for all ratings.

18.0 **BUSHINGS:**

(i) For 11 KV- 12 KV Bushing will be used and for 433 volts 1.1 KV terminal bushing will be used. Bushings of the same voltage class shall be interchangeable. Bushings with plain sheds as per IS - 3347 shall be mounted on side of the tank and not on the top cover. Only continuous sheet metal pocket shall be provided for mounting of all H.V./ L.V. bushings and the same shall not be fixed on pipes. Sheet metal pocket shall be designed in such a way that all HT bushings shall remain parallel and equidistance all through and inside connections of windings to bushings shall remain within the pocket. Bushings having type tested as per IS-3347 shall only be acceptable.

(ii) **Internal Connections**: - In case of HV winding, all jumpers from windings to bushing shall have cross section larger than the winding conductor (normally, 1.5 times). For copper winding, joints will be made by using silver brazing alloy. For Aluminium winding, L & T Alkapee Aluminium brazing rods with suitable flux will be used or alternatively joints will be made by using tubelar connectors properly crimped at three spots. Aluminium brazing rods to be used ring formed on other end and nut bolting on HV bushing stud.

LT Star connection will be made by using Aluminium/Copper Flat and properly brazed or bolted with the crimped lugs on windings by means of plain or spring washers and lock nuts to the flat. Other end of the conductor is brazed on "L" shape Aluminium /copper flat and flat nut bolted with neutral bushing stud. ALTERNATIVELY, for 63 & 100 KVA ratings all the three terminals of LV windings together with terminals for neutral bushing shall be properly brazed and then covered with Aluminium tubular sleeve of suitable length and cross sectional area duly crimped in order to provide sufficient strength to the joint. The star connection should be wrapped with cotton/paper tape.

Firm connection for LV winding to bushings shall be made by adequate size of "L" shape flats nut bolted with LV Bushing stud.

For delta formation on HV side, copper wire having cross sectional area 1.5 times the winding area should be used. SRBP tube/insulation paper should be used on delta connection and on the portion of HV winding joining to HV bushing.

19.0 **ROLLERS** :

For Transformers of rating 200 KVA and above four Nos. rollers of 150 mm diameter and 50 mm width shall be provided.

20.0 **TANK BASE CHANNEL** :

To be fitted across the length of the transformer.

(i) For 63 and 100 KVA Transformers - Two channels of 75 mm x 40 mm.
(ii) For 200 & 315 KVA Transformers - Two channels of 100 mm x 50 mm.

21.0 **TERMINAL MARKING PLATES AND RATING PLATES** :

The transformers shall be provided with a plate showing the relative physical position of the terminal and their markings engraved on it. The transformers shall be provided with non-detachable rating plate of Aluminium anodized material fitted in a visible position, furnishing the information as specified in IS: 2026. The rating plate shall be embossed /engraved type but not such printing. The relative position of tapping switch and corresponding voltages may also be shown on the rating plate.

Further, MS plate of size 125x125 mm be got welded on width side of the transformer on stiffener angle. On this plate Name of firm, Order No. & Date, Rating, Serial Number of transformer, name of inspecting officer & his designation and Date of despatch should be engraved.

22.0 **FITTINGS:**

The fittings on the transformers shall be as under:

(i) Rating and diagram plate - 1 No.
(ii) Earthing terminals with lugs - 2 Nos.
(iii) Lifting lugs 8 mm thick reinforced by welded plates edge-wise below the lugs Upto reinforcing angle of the tank. - 2 Nos. upto 100 KVA and 4 Nos. above 100 KVA.

(iv) Oil filling hole with cap on conservator - 1 No.
(vi) Conservator with drain plug - 1 No.
(vii) Thermometer pocket - 1 No.
(viii) Aluminium die cast Silica gel breather (500 gms. capacity upto 200 KVA and 1000 gms. for 315 & 500 KVA.) - 1 No.

(ix) Platform mounting channel (with hole suitable for axle of roller for transformers of 200 KVA and above rating) - 2 Nos.

(x) Oil level gauge indicating three position of oil marked as below :
a - Minimum (-) 5 ^{o}C
b - 30 ^{o}C
c - Maximum 98 ^{o}C

(xi) Bushings :
H.T. - 3 Nos.
L.T. - 4 Nos.

Each bushing should be provided with 3 Nos. of brass/tinned copper nuts and 2 plain brass washers for connecting terminal.

(xii) Radiator - Details shall be given as per drawing (to be provided on L.V. side upto 100 KVA).

(xiii) Arcing horn for H.T bushings - 6 Nos.
(xiv) Pulling lugs - 4 Nos.
(xv) Metallic cover spot welded to tank for drain valve shall be provided .

(xvi) Explosion vent in case of transformers of 200 KVA and above. - 1 No.

(xvii) Rollers for 200 KVA and above - 4 Nos. (150 mm dia and 50 mm wide)

(xviii) Filter valve - 32mm dia for 200 KVA and above - 1 No.

(xix) Off circuit tap changing switch with indicator handle and locking device with tap ranging from (+) 3% to (-) 9% in steps of 3% on HV side for HV variation. Direction of rotation marked. - 1 No.

(xv) Top cover lifting lugs - 2 Nos.

(xvi) Bimetallic connectors for all ratings

to be fitted on the studs:

HV - 3 Nos.
LV - 4 Nos.

23.0 **TRANSFORMER OIL**:

The transformer shall be supplied complete with first filling of oil and the same shall comply with IS: 335 -1983 with latest version thereof and ageing characteristics specified. These characteristics are shown in Annexure-VI . Type tests certificate of oil being used shall be produced at the time of inspection.

24.0 **FINISHING**:-

The exterior of the transformer and other ferrous fittings shall be thoroughly cleaned, scraped and given primary coat and the two finishing coats of durable oil and weather resistant paint of enamel. The colour of the finishing coats shall be DARK GREEN conforming to IS:5 of 1961 (colours for ready mixed paints) with conservator painted with white colour.

25.0 **TEST & TEST CERTIFICATES:**

The following routine tests and type tests are required to be carried out on the transformers.

A) **Routine Tests**:- Before despatch each of completely assembled transformer shall be subjected at the manufacturers works to the following routine tests in accordance with the details specified in IS:2026.

(a) Measurement of winding resistance.
(b) Ratio, polarity and phase relationships .
(c) Impedance voltage.
(d) No load losses and no load current.
(e) Load losses.
(f) Insulation resistance.
(g) Separate source voltage withstand.
(h) Induced over voltage with stand.

Unbalanced current test: The value of zero sequence current in the star winding shall not be more than 2% of the full Load current.

Pressure and vacuum test : The tank shall be fixed with a Dummy cover with all fittings including bushing in position and be subjected to following pressure/vacuum created inside the tank:-

(i) 0.8 Kg./cm sq. above atmospheric pressure for 30 minutes.
(ii) A vacuum corresponding to (-) 0.7 Kg/cm sq. for 30 minutes.

Permanent deflection of flat plate, after pressure has been released, shall not exceed the values given below:-

Length of plate	**Deflection**
Upto 750 mm	5 mm
751 to 1250 mm	6 mm
1251 to 1750 mm	8 mm

Vector Group Test:- All the transformers must be complied with requirements to confirm the Vector Group of DY-11.

B) **TYPE TESTS:**

In addition to the routine tests as above, the following type tests shall be carried out on the transformers in accordance with ISS: 2026/1977 as amended from time to time:-

(a) Lightening impulse voltage withstands test
(b) Dynamic ability to withstand short circuit test. .

26.0 The suppliers may carefully note our following specific requirements of short circuits & impulse voltage:

(a) **Short Circuit Test and Impulse Voltage Withstand Test** : The Board intents to procure transformers designed and successfully tested for short circuit and impulse test. In case the transformers proposed for supply against the order are not exactly as per the tested design, the supplier shall be require to carry out the short circuit test and impulse voltage test at their own cost in the presence of the representative of the Board. The supply shall be accepted

only after such test is done successfully, as it confirms on successful withstand of short circuit and healthiness of the active parts thereafter on un-tanking after a short circuit test. Apart from dynamic ability test, the transformers shall also be required to withstand thermal ability test or thermal withstand ability will have to be established by way of calculations. It may also be noted that the Board reserve the right to conduct short circuit test and impulse voltage test in accordance with the ISS, afresh on each ordered rating at Board's cost, even if the transformers of the same rating and similar design are already tested. This test shall be carried out on a transformer to be selected by the Board either at their works when they are offered in a lot for supply or randomly from the supplies already made to Boards Area Stores. The findings and conclusions of these tests shall be binding on the supplier.

In case the transformer does not pass in either of the tests and if the active part details are not found to be in line with the design tested and approved, the following punitive measures shall be taken:-

(i) 5% payment of the bill for the supplies already made will be recovered by the Board.

(ii) For transformers already supplied, the guarantee period shall stand twice the normal guarantee period incorporated in the and the period of performance Security Deposit shall be suitably extended to cover the extended guarantee period.

(iii) Further, supply of balance quantity of transformers will not be accepted by the Board, till another transformer from the manufactured batch is satisfactorily tested (OR transformers are modified according to the tested design) for both tests at your cost and consequent to this if there is any delay in executing the order, the same shall be to your account. Board reserves the right to take action as per terms and conditions of the order.

(iv) The tests charges shall be borne by the firm. Please note that if the terms and conditions detailed above regarding short circuit withstand test & impulse voltage test on transformers and procedure for these tests are not accepted by you in full, action will be taken as deemed fit as per the terms of the order.

(b) **Temperature rise test**: - Heat run test shall have to be conducted at suppliers cost on one transformer of each rating in any offered lot during the course of supplies. In case of transformers with tap, test shall be conducted on the lowest tap feeding corresponding losses at 75^{o} C .

To facilitate conduction of heat run test on any unit in any lot at any point of time during the supplies, the manufacturers will provide a thermometer pocket which gets immersed in oil on the side of the transformer in all the transformers. This pocket shall also be used for connecting thermal sensing device to monitor the variations in temperature and whenever required to operate the protective devices. The Sensor pocket shall be of 12 MM diameter with blanking screwed cap, removable at site. The depth of the projecting stem of this pocket inside the transformer will be below oil level. It shall not infringe with electrical clearance nor obstruct the un-tanking of the active part.

(c) **OVER FLUXING OF CORE**:-

Transformer shall be subjected to test for over fluxing of core, wherever required by the Board's inspecting officer.

(d) **TEST FOR SPILL CURRENT IN NEUTRAL:**

The test will comprise of measuring current between shorted secondary phases and neutral on applying impedance voltage at primary winding. The value should not exceed 2% of full load current.

27.0 **ACCEPTANCE TESTS**:

The following tests shall be witnessed by the Purchaser/Representative at the firm's works :-

(i) All the routine tests as mentioned in 25(A) above shall be performed on minimum10% quantity of offered lot.
(ii) Heat run test – On one unit out of total ordered quantity.
(iii) Verification of active parts on one unit of each rating of ordered quantity along with weighment of unit.

28.0 **TESTING FACILITIES:**

he tenderer should have adequate testing facilities for all routine and acceptance tests and also arrangement for measurement of losses, resistance etc.

29.0 **INSPECTION**:

(a) To ensure about the quality of transformers, the inspection shall be carried out by the Board's representative at following two stages:-

(i) When the raw material is received, and the assembly is in process in the shop floor.

(ii) At finished stage i.e. transformers are fully assembled and are ready for despatch.

(b) After the main raw-materials i.e. core and coil materials and tanks are arranged and transformers are taken for production on shop floor and a few assembly have been completed , the firm shall intimate the O/o CE(S&P-EZ) , MPPKVVCL, Jabalpur in this regard, so that an officer for carrying out such inspection could be deputed, as far as possible within seven days from the date of intimation. During the stage inspection a few assembled core shall be dismentled to ensure that the CRGO laminations used are of good quality. Further, as and when the transformers are ready for despatch, an offer intimating about the readiness of transformers, for final inspection for carrying out tests as per relevant I.S.S. and as in clause 25(A) above, shall be sent by the firm along with Routine Test Certificates. The inspection shall normally be arranged by the Company at the earliest after receipt of offer for pre-delivery inspection.

(c) In case of any defect/defective workmanship observed at any stage by the Board's Inspecting Officer, the same shall be pointed out to the firm in writing for taking remedial measures. Further processing should only be done after clearance from the Inspecting Officer/ this office.

(d) All tests and inspection shall be carried out at the place of manufacture unless otherwise specifically agreed upon by the manufacturer and purchaser at the time of purchase. The manufacturer shall offer the Inspector representing the Purchaser all reasonable facilities, without charges, to satisfy him that the material is being supplied in accordance with this specification. This will include Stage Inspection during manufacturing stage as well as Active Part Inspection during Acceptance Tests.

(e) Random sample checking and testing of the transformer selected at random from the supplies made to the Area Stores shall be done for verification of technical details, design, routine test and losses as per approved G.T.P., drawings and technical specification of the order. Please note that:-

(**A**)(i) Some of the transformers shall be selected randomly from the lot received in Area Stores and shall be subjected to routine testing as per IS:1180 and 2026 (with latest amendments) at MTRU, Jabalpur/ CPRI, Bhopal, CPRI, Bangalore/ERDA, Vadodara/any reputed Govt. Laboratory.

(ii) It is only after the results of randomly selected transfers are found satisfactorily, the MRC shall be issued and the transformers of the lot shall be accepted / issued to field units.

(iii) Serial number, name of the inspecting officer and his designation shall have to be embossed by the manufacturer on the tank of every transformer.

(**B**) In case of emergency, the transformers are issued in the field before obtaining the test results from the Laboratory and in the event of failure of any transformer in any/all routine tests later on, the following action shall be taken for that particular lot / order only:-

(i) 5% payment of the bill for the supplies already made will be recovered by Discom-EZ.

(ii) For transformers already supplied, the guarantee period shall stand twice the normal guarantee period and the period of performance security deposit shall be suitably extended to cover the extended guarantee period.

(iii) The supplier shall be intimated about the results of such test to make suitable improvement in his manufacturing process and to ensure quality control.

(iv) If any transformers are available in the area stores, these shall have to be replaced by the manufacturer at his own cost.

(v) One unit of each capacity from the next lot will be sent to the identified laboratory for carrying out routine tests. In case the transformer fails again in any or all routine test, no

further supply shall be accepted and the transformers available at area stores supplied against the current order shall have to be taken back by the manufacturer at his own cost.

(vi) The manufacturer will have to carry out suitable improvement in the design of the transformer and get it type tested in presence of Company's representative at his own cost. It is only after the transformer successfully passes the type test, the supplies shall be resumed. Further, the penalty towards delayed supplies shall be to manufacturer's account (if any).

(f) The Purchaser has all the rights to conduct the test including type tests, at his own cost by an independent agency whenever there is dispute regarding the quality of supply or interpretation of test results. In the event of failure of transformers in such tests, the expenses incurred in testing shall be to the Supplier's account as already mentioned above in case of random testing.

30.0 **INSPECTION & TESTING OF TRANSFORMER OIL :**

To ascertain the quality of the transformer oil, the original manufacturer's tests report should be submitted at the time of inspection. Also arrangements should be made for testing of transformer oil, after taking out the sample from the manufactured transformers and tested in the presence of purchaser's representative.

31.0 **TEST REPORTS ON THE ANALYSIS OF RAW MATERIALS :**

The supplier shall furnish details of source(s) of raw-materials, test certificates and report on the analysis of electrolytic Copper/Aluminium used for the winding and the steel used for core, insulation material and also other bought out items from sub-suppliers.

32.0 **DRAWINGS** :

The dimensional drawing and internal construction drawing of each rating of transformer shall be submitted with the tender. Guaranteed and other technical particulars of the transformers should also be submitted in A-4 size for our approval.

Chief Engineer (S&P-EZ)
MPPKVVCL : Jabalpur

ANNEXURE - III

QUALITY ASSURANCE - INSPECTION OF TRANSFORMERS.

1.01 To ensure about the quality of transformers, the inspection shall be carried out by the representative of the Discom-EZ at following two stages:-

(i) Where raw material is received, and the assembly is in process on the shop floor.
(ii) At finished stage i.e. transformers are fully assembled and are ready for despatch.

1.02 After the main raw-materials i.e. core and coil materials and tanks are arranged and transformers are taken for production on shop floor and a few assembly have been completed , the firm shall intimate the O/o CE(S&P-EZ), Jabalpur in this regard, so that a team of officers for carrying out such inspection could be deputed, as far as possible within seven days from the date of intimation. During the stage inspection a few assembled core shall be dismantled to ensure that the CRGO laminations used are of good quality and manufacturing is confirmed in line with approved Guaranteed Technical Particulars/Drawings. The report of stage inspection is to be prepared in the prescribed proforma.

1.03 A quantity of more than 100 Nos. shall not be entertained for stage inspection. Further, the stage inspection shall be carried out in case:-

(a) Atleast 25% quantity offered has been tanked, and
(b) Core coil assembly of further atleast 30% of the quantity offered has been completed.

1.04 In case of any defect/defective workmanship observed at any stage by the Discom-EZ inspecting Officer, the same shall be pointed out to the firm in writing for taking remedial measures. Further processing should only be done after clearance from the Inspecting Officer / this office.

1.05 Quantity offered for stage inspection should be offered for final inspection in full within 15 days from the date of issue of clearance for stage inspection, otherwise stage inspection already cleared shall be liable for cancellation.

1.06 The checks to be exercised during the stage inspection have been listed in the Annexure- IV enclosed.

1.07 As and when the transformers are ready for despatch, an offer intimating about the readiness of transformers for carrying out pre-despatch inspection as per relevant I.S.S. and as in clause-25(A)
of Annexure-II, shall be sent by the firm. The inspection shall normally be arranged by the Discom-EZ at the earliest after receipt of offer for pre-delivery inspection.

1.08 During the pre-despatch inspection, the routine tests as per I.S. 1180 & 2026 shall be carried out at the works of the firm on randomly selected transformers in presence of company's representative.

1.09 Further, one unit of each rating offered shall be dismantled at the time of pre-despatch inspection for physical verification for the constructional details. The report of pre-despatch inspection is to be prepared in the prescribed proforma.

Please ensure that reports of stage inspection and pre-despatch inspection are prepared strictly in the prescribed proforma and no detail is left blank. Incomplete report may cause delay in supply of transformers which shall be to the supplier's account.

Chief Engineer (S&P-EZ)
MPPKVVCL : Jabalpur

ANNEXURE – IV

PROFORMA FOR STAGE INSPECTION OF DISTRIBUTION TRANSFORMERS

(A) **GENERAL INFORMATION**:

1. Name of firm : M/s.

2. Order No. & Date :

3. Rating-wise quantity offered :

4. Details of offer

   a) Rating
   b) Quantity
   c) Serial Numbers

5. Details of last stage inspected lot:
   a) Total quantity inspected
   b) Serial Numbers
   c) Date of stage inspection
   d) Quantity offered for final inspection of (a) above with date

(B) **Availability of material for offered quantity** :
Details to be filled in Appendix "X".

(C) **Position of manufacturing stage of the offered quantity** :
   a) Complete tanked assembly
   b) Core & coil assembly ready
   c) Core assembled
   d) Coils ready for assembly
      (i) HV Coils
      (ii) LV Coils

NOTE : (i) A quantity of more than 100 Nos. shall not be entertained for stage inspection.
(ii) The stage inspection shall be carried out in case :-
(a) atleast 25% quantity offered has been tanked and
(b) core coil assembly of further atleast 30% of the quantity offered has been completed.
(iii) Quantity offered for stage inspection should be offered for final Inspection within 15 days from the date of issuance of clearance for stage inspection, otherwise stage inspection already cleared shall be liable for cancellation.

Sl. No	Particulars	As offered	As found	Deviation & Remarks
(D)	**Inspection of Core** : (I) **Core Material** (1) Manufacturer's Characteristic Certificate in respect of grade of lamination used. (Please furnish test certificate)			
	(2) Remarks regarding Rusting and smoothness of core.			
	(3) Whether laminations used for top & bottom yoke are in one piece. (II) **Core Construction** :			
	(1) No. of Steps			
	(2) Dimension of Steps			

	Step No.	1	2	3	4	5	6	7	8	9	10	11	12
	As offered:-												
	W mm												
	T mm												
	As found :-												
	W mm												

	(3) Core Dia		
	(4) Total cross Section area of core		

Sl. No	Particulars	As offered	As found	Deviation & Remarks
	(5) Effective cross Sectional area of core			
	(6) Clamping arrangement			
	(i) Channel Size			
	(ii) Bolt size & No.			
	(iii) Tie Rods size & No.			
	(iv) **Painting**			
	(a) Channels			
	(b) Tie Rods			
	(c) Bolts			
	(7) Whether top yoke is cut for LV connection.			
	(8) If yes, at 7 above, whether Reinforcement is done.			
	(9) Size of Support Channels provided for Core base & bottom yoke (Single piece of channels are only acceptable) .			
	(10) Thickness of insulation provided between core base and Support channel.			
	(11) core length (leg center to leg center)			
	(12) Window height			
	(13) Core height			
	(14) Core weight only (without channels etc.)			
(E)	**INSPECTION OF WINDING**			
(I)	**Winding material**			
	(1) Material used for (a) HV winding (b) LV winding			
	(2) Grade of material (a) HV (b) LV			
	3) Test certificate of manufacturer (enclose copy) for winding material of: (a) HV (b) LV			
(II)	**CONSTRUCTIONAL DETAILS**			
	(1) Size of Cross Sectional area of conductor (a) HV (b) LV			
	(2) Type of insulation for conductor (a) HV (b) LV			
	(3) Diameter of wire used for delta formation			
	(4) Diameter of coils a) LV i) Internal dia ii) Outer dia b) HV i) Internal dia ii) Outer dia			
	(5) Current Density of winding material used for :			

Sl. No	Particulars	As offered	As found	Deviation & Remarks
	(a) HV (b) LV			
	(6) Whether neutral formation on top.			
	(7) HV Coils/ Phase a) Number b) Turns / coil c) Total turns			
	(8) LV Coils/ Phase a) Number b) Turns / coil c) Total turns			
	(9) Method of H.V. Coil Joints (10) Total weight of coils of a) LV winding b) HV winding			
(F)	**INSULATION MATERIALS** :			
	(I) **MATERIAL** :			
	1) Craft paper a) Make b) Thickness c) Test Certificate of manufacturer (enclose copy).			
	2) Press Board a) Make b) Thickness c) Test Certificate of manufacturer (enclose copy). 3) Material used for top & bottom yoke and insulation			
	(II) **Type & thickness of material used** : a) Between core & LV b) Spacers c) Inter layer d) Between HV & LV winding e) Between phases f) End insulation			
(G)	**CLEARANCES** :-			
	(I) **Related to core & windings** 1) LV to Core (Radial) 2) Between HV & LV (Radial) 3) (i) Phase to phase between HV Conductor (ii) Whether two Nos. Press Board each of minimum 1 mm thick provided to cover the tie rods.			
	4) Thickness of locking spacers between LV coils			
	5) Axial wedges between HV & LV coils / phase (Nos.)			
	6) No. of radial spacers / phase between HV coils			
	7) Size of duct between LV & HV winding			
	(II) **Between core - coil assembly & tank** :			
	1) Between winding & body: a) Tank lengthwise b) Tank Breadhwise			
	2) Clearance between top cover & top yoke upto 100 KVA &			

Sl. No	Particulars	As offered	As found	Deviation & Remarks
	between top cover and top most live part of tap changing switch for 200 KVA & above.			
(H)	**TANK** :			
	(I) **Constructional details** : 1) Rectangular shape 2) Thickness of side wall 3) Thickness of top & Bottom 4) Provision of slopping top cover towards HV bushing. 5) Tank internal dimensions a) Length b) Breadth c) Height (i) On LV side (ii) On LV side			
	(II) **General details** : 1) Inside painted by varnish / oil corrosion resistant paint (please specify which type of coating done).			
	2) Gasket between top cover & tank i) Material ii) Thickness iii) Jointing over laps			
	3). Reinforcement of welded angle (specify size and No. of angle provided) on side walls of tank.			
	4) Provision of lifting lugs: a) Numbers b) Whether lugs of 8 mm thick MS Plate provided c) Whether reinforced by welded plates edge wise below the lug upto re-enforcing angle of the tank, done.			
	5) Pulling lug of MS Plate a) Nos. b) Thickness c) Whether provided on breadth side or length side			
	6) Provision of air release plug			
	7) Provision of galvanized GI Nuts Bolts with 1 No. Plain & 1 No. spring washer.			
	8) Deformation of length wise side wall of tank when subject to: a) Vacuum of (-)0.7 Kg./sq.cm. for 30 minutes. b) Pressure of 0.8 Kg./sq.cm. for 30 minutes.			
(I)	**RAIDATORS** :			
	1. Fin Radiators of 1.25 mm thick sheet a) Dimension of each fin (LxBxT) b) Fins per radiator c) Total No. of radiators			
	2. Verification of manufacturer's test certificate regarding Heat dissipation (excluding			

Sl. No	Particulars	As offered	As found	Deviation & Remarks
	Top & Bottom) in w/sq.Mtr.			
	3. Verification of position of radiator with respect to Bushing.			
(J)	**CONSERVATOR** :			
	1. Dimensions (L x D)			
	2. Volume			
	3. Inside dia of Conservator tank pipe			
	4. Whether conservator outlet pipe is projected approx. 20mm inside the conservator tank.			
	5. Whether arrangement made so that oil does not fall on the active parts.			
	6. Whether die cast metal oil level gauge indicator having three positions at (- 5° C, 30 ° C and 98 °C) is provided .			
	7. Whether drain plug and filling hole with cover is provided.			
	8. Inner side of the conservator Tank painted with-			
(K)	**BREATHER** :			
	1. Whether Die cast Aluminium body breather for silica gel provided.			
	2. Make			
	3. Capacity			
(L)	**TERMINALS** :			
	1. Material wheather of Brass Rods/ Tinned Copper. a) HV b) LV			
	2. Size (dia in mm) a) HV b) LV			
	3. Method of Star connection formed on LV side of 6mm thick (Should use Al./Cu. Flat bolted/ brazed with crimped lugs on wdg. alternatively for 63 & 100 KVA ratings brazing is done covered with tublar sleeve duly crimped). - Please state dimensions of Al./Cu. flat or tublar sleeve used.			
	4. Method of Connection of L.V. winding to L.V. Bushing (end of wdg. should be crimped with lugs (Al./Cu.) & bolted with bushing stud.)			
	5. Method of Connection of H.V. winding to H.V. bushing (Copper joint should be done by using silver brazing alloy and for Aluminium L&T brazing rod or with tublar connector crimped at three spots).			
	6. Whether SRBP tube/insulated paper used for formation of Delta on HV.			
	7. Whether Empire sleeves used			

Sl. No	Particulars	As offered	As found	Deviation & Remarks
	on the portion of HV winding joining to HV bushing.			
	8. Whether neutral formation is covered with cotton tape			
(M)	**BUSHINGS** :			
	1. Whether H.V. bushings mounted on side walls.			
	2. Whether Sheet metal pocket used for mounting bushing (pipe are not acceptable) a) HV b) LV			
	3. Whether arrangement for studs for fitting of HV Bushing are in diamond shape (so that Arcing Horns are placed vertically).			
	4. Position of mounting of L.V. bushings.			
	5. Bushing Clearance: a) LV to Earth b) HV to Earth c) Between LV Bushings d) Between HV Bushings			
(N)	**TANK BASE CHANNEL / ROLLERS** : 1. Size of channel			
	2. Whether channels welded across the length of the tank			
	3. Size & type of Roller			
(O)	**OIL** :			
	1. Name of supplier			
	2. Break down voltage of oil : i) Filled in tanked transformer ii) In storage tank (to be tested by Inspecting Officer).			
	3. Supplier's test certificate (enclose copy)			
(P)	**ENGRAVING** :			
	1. Engraving of Sl. No. & name of firm. i) On bottom of clamping channel of core-coil assembly. ii) On side wall & top cover of tank along with date of despatch.			
(Q)	i) MS plate of size 125x125mm welded on width side of stifner ii) Following details engraved (as per approved GTP):- (a) Serial Number (b) Name of firm (c) Order No. & Date (d) Rating (e) Name of Inspecting Officer (f) Designation (g Date of dispatch			
(R)	**FITTINGS** :			
	Whether all the fittings as per Schedule-II of detailed order are			

Sl. No	Particulars	As offered	As found	Deviation & Remarks
	available.			
(S)	**NAME PLATE DETAILS** : Whether Name Plate is as per approved drawing and Schedule-III of order.			
(T)	**Colour of Transformer**			
	1. Tank body with dark Green colour 2. Conservator with white colour			
(U)	**CHECKING OF TESTING FACILITIES**:			
	(Calibration certificate also to be checked for its validity)			
	TESTS :			
	1. No Load Current			
	2. No Load Loss			
	3. % Impedance			
	4. Load Losses			
	5. Insulation Resistance Test			
	6. Vector Group Test (phase relationship)			
	7. Ratio & Polarity test relationship)			
	8. Transformer Oil Test (Break Down Voltage)			
	9. Magnetic Balance			
	10. Measurement of winding resistance (HV & LV both)			
	11. Induced over voltage withstand test (Double voltage & Double frequency)			
	12. Separate source Power frequency withstand test at 28 KV & 3 KV for one minute.			
	13. Air pressure/ Oil leakage Test			
	14. Vacuum test			
	15. Unbalanced current test			
	16. Temperature rise (Heat Run) test.			
(V)	We have specifically checked the following and found the same as per G.T.P./deviations observed as mentioned against each: -			
	i) Rustlessness of CRGO laminations used ii) Core steps iii) Core area iv) Core weight v) Wdg. cross sectional area a) LV b) HV			
	vi) Weight of windings			
	vii) Clearance between wdg. & wall of tank a) Lengthwise b) Breadth-wise			
	viii) Clearance between top of yoke/ top most live part of tap changer to tank cover.			
	ix) Details of Neutral formation			
	x) Connections to bushings: a) LV b) HV			

Sl. No	Particulars	As offered	As found	Deviation & Remarks
	xi) Slope of tank top			
	xii) Position of mounting of bushings			

COMPANY'S INSPECTING OFFICER FIRM'S REPRESENTATIVE

DATE OF INSPECTION:

A N N E X U R E – V

PROFORMA FOR PRE-DELIVERY INSPECTION OF DISTRIBUTION TRANSFORMERS

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

ACCEPTANCE TESTS TO BE CARRIED OUT

S. No.	PARTICULARS		OBSERVATIONS
1	(a) Ratio Test		AB/an BC/bn CA/Cn
	(b) Polarity Test		
2	No load loss measurement		(I) W1 W2 W3
		TOTAL	
	Multiplying Factor CT Watt meter Total x MF NET LOSS		
3.	Load loss measurement		(I) W1 W2 W3
	TOTAL		
	Multiplying Factors:- **CT** **Watt meter** **PT** Total x MF Loss at ambient temperature Loss at 75^0 C (with calculation sheet)		
4	Winding Resistance :- **H.V.** (In Ohms) (a) At ambient temperatre of _____ ^{0}C. (b) Per Phase resistance at 75 ^{0}C.		A-B B-C C-A a-b b-c c-a
	L.V. (In mili Ohm) (a) At ambient temperatre of _____ ^{0}C. (b) Per Phase resistance at 75 ^{0}C.		a-b b-c c-a a-n b-n c-n
5	Insulation Resistance	:	HV-LV HV-E LV-E
6	Separate Source Voltage test	**HV**	28 KV for 60 secs.

S. No.	PARTICULARS	OBSERVATIONS
	LV	3 KV for 60 secs.
7	Induced over-voltage test at double voltage & double frequency	100 Hz, 866 volts for 60 seconds.
8	No load current at 90% volts 110% volts	
9	Unbalance current	
10	Vector group test	Diagram and readings be shown in separate sheets
11	Percentage Impedance at 75^0 C (Please furnish calculation sheet)	
12	Transformer oil test (Break down voltage)	
13	Oil leakage test	
14	Heat run test	To be carried out once against the order
15	Bushing clearance (a) Phase to Phase (b) Phase to Earth	**HV** **LV**
16	Comments on compliance by the firm on the modifications done as per stage inspection clearance letter issued by the O/o CE(S&P)	
17	Whether fittings as per Schedule-II of the order have been verified.	
18	Whether **Aluminium die cast** silica gel breather with tin container is fitted on the transformers offered.	
19	Whether engraving of S.No. & Name of firm on core clamping channel, side wall and top cover of tank has been verified.	
20	Whether MS Plate of size 125 x 125mm welded on with side of stifner	
21	Whether engraving of Name of firm, Serial No. & Rating of transformer, Order No. & date and Date of Despatch on MS Plate.	
22	Copy of calibration certificates of metering equipments be enclosed.	

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

S. No.	PARTICULARS	OBSERVATIONS
1	Details of the transformer dismantled for physical verification (a) Rating (b) S. No.	
2	Whether GI Nut Bolts with one spring one plain washer provided for tightening the tank cover.	
3	Details of gasket used between top cover and tank Material Thickness Type of joints	
4	Whether core is earthed properly with copper strip (one end should be tightened in between the core laminations and other end bolted on core clamping channel.	
5	Connections from winding to bushings (describe the manner in which it has been done) (a) HV (b) LV (c) Formation of Star connection on LV side.	
6	Winding dia and cross sectional area :	
(a)	**HV**	
(i)	Dia	
(ii)	Area	
(b)	**LV**	
(i)	L x W x Nos. of layer	
(ii)	Area	
7.	Thickness of press board (s) provided between HV coils to cover the tie rods	
8.	Whether painted with oil and corrosion resistant paint / varnish (a) Inside of the tank (b) Inside of the conservator tank (c) Core clamping and core base channels (d) Tie rods (e) Core bolts	
9	Whether tie rods and core bolts insulated, If yes, material of insulation.	
10	Whether flap on inner side of top cover provided to prevent direct falling of oil on core- coil assembly.	
11	Method of joints (a) Between HV Coils (b) Between tap coils (c) For tap changer	
12	Whether engraving of Sl. No. and name of firm done on bottom channel of core coil assembly.	
13	Dia of copper wire, used for formation of delta (should not be less than 1.5 time/dia of conductor).	
14	Whether empire sleeves provided upto the end portion of HV winding joining to bushing	
15	**HV** Coils : (a) Inner dia (b) Outer dia	
16	**LV** Coils : (a) Inner dia (b) Outer dia	
17	Core dia	
18	Core height including base channel & insulation in between	
19	Leg Center of core	
20	Clearances between (a) Core & LV (b) HV & LV (c) Phase to phase of HV coils (d) Core coil assembly and tank body (i) Length-wise (ii) Width-wise	

S. No.	PARTICULARS	OBSERVATIONS
	(e) Top of yoke and top cover (f) Top most live part of tap changer and top cover.	
21	Weight of core only.	
22	Weight of windings (a) LV (b) HV	
23	Whether core laminations are in one piece, used for (a) Bottom yoke (b) Top yoke	
24	Specific remarks regarding smoothness and rusting of core used.	
25	Volume of oil filled (to be done once against the order) (a) In conservator tank (b) In tank of the transformer	
26	Weight of transformer (inclusive of all fittings, accessories, oil etc. complete)	
27	Inner dimensions of the tank (a) Length (b) Width (c) Height (i) LV side (ii) HV side	
28	Remarks, if any :	

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

SIGNATURE OF INSPECTING OFFICER (with Name & Designation)

SIGNATURE OF FIRM'S REPRESENTATIVE

DATE OF INSPECTION : _____

ANNEXURE-VI

TECHNICAL SPECIFICATIONS AND GUARANTEED TECHNICAL PARTICULARS OF EHV GR.II NEW INSULATING TRANSFORMER OIL

Insulating oil for Transformers & Switchgears shall be as per ISS-335-1993 (fourth revision) incorporating upto date amendment and additional characteristics as incorporated below.

It will be pure hydrocarbon mineral oil, clean and sufficiently free from moisture and of other foreign matter likely to impair its properties.

The test results for the characteristics of the oil when tested in accordance with ISS 335-1993 (fourth revision) incorporating up-to-date amendment and additional characteristic required by us, shall be as here-under:-

S. No	Schedule of characteristics (Clauses 5.1 and 9.1 of ISS)	Characteristics of transformer oil	Reference to test methods as per IS 335-1993 and with latest amendments.
1	2	3	4
1	Appearance	The oil shall be clear and transparent & free from suspended matter or sediments	A representative sample of the oil shall be examined in 100mm thick layer at 27°C.
2	Flash Point Pensky Marten (Closed) (Min.)	140°C	IS: 1448/1970
3	Pour point (Max.)	(-) 6° C	IS:1448/1970
4	Neutralization value		
	a)Total acidity, Max.	0.03 mg KOH/g	IS:1448/1967
	b)Inorganic acidity/alkalinity	NIL	
5	Corrosive Sulphur	Non-corrosive	Annexure-B IS:335/1993
6	Electric Strength(breakdown voltage) (Min.):		
	a) New unfiltered oil	30 KV (rms)	IS:335/1993
	b) New oil after filtration	60 KV (rms) (If the above value is not attained, the oil shall be filtered)	IS:335/1993
7	Dielectric dissipation factor (tan delta) at 90°C (Max.)	0.002	IS:6262-1971
8	Specific resistance	(resistivity) (Min.)	IS:6103/1971
	a) at 90°C	$35x10^{12}$ Ohm	
	b) at 27°C	$1500x10^{12}$ Ohm	
9	Oxidation stability:		
	(a) Neutralization value after oxidation (Max.)	0.40 mg KOH/g	Annexure-C of IS:335/1993
	(b) Total sludge after oxidation (Max.)	0.10% by weight	
10	S.K. Value	4% to 8%	Annexure-D of IS:335/1993
11	Ageing characteristics after accelerated ageing (open beaker method with copper catalyst):		IS:12177/1987 (Method-A)
	a) Specific resistance (resistivity)		IS:6103/1971
	i) at 27°C (Min.)	$2.5x10^{12}$ Ohm	
	ii) at 90°C (Min.)	$0.2x10^{12}$ Ohm	
	b) Dielectric dissipation factor (Tan Delta) (Max.)	0.20	IS:6262/1971
	c) Total acidity (Max.)	0.05 mg KOH/g	IS:1448/1967
	d) Total sludge value	0.05% by weight	Annex.-A of IS:12177

S. No	Schedule of characteristics (Clauses 5.1 and 9.1 of ISS)	Characteristics of transformer oil	Reference to test methods as per IS 335-1993 and with latest amendments.
1	2	3	4
12	Interfacial tension at 27°C(Min.)	0.04 N/m	IS:6104/1971
13	Water content (Max.)	50 PPM	IS:13567/1972
14	Density at 29.5 °C (Max.)	0.89 g/cm^3	IS:1448/1977
15	Kinematic Viscosity at 27°C (Max.)	27°C	IS:1448/1976
16	Present of Oxidation inhibitor.	The oil shall not contain additives.	IS:13631/1992 antioxidant
(B) CHARACTERISTICS OF OIL IN THE TRANSFORMER			
	The important characteristics of the transformer oil after it is filled in the transformer (within 3 months of filling) shall be as follows :-		
1	Electric strength (breakdown voltage)	30 KV(Min.)	
2	Dielectric dissipation factor Tan.Delta at 90° C	0.01(Max.)	
3	Specific resistance (Resistivity) at 27°C (Ohm-cm.)	10 x 10^{12} Ohm.cm	
4	Flash point, P.M. (closed)	140°C (Min.)	
5	Interfacial tension at 27°C	0.03 N/m (Min.)	
6	Neutralization value (total acidity)	0.05 mg KOH/g(Max.)	
7	Water content		35 PPM (Max.)

Chief Engineer (S&P-EZ)
MPPKVVCL : Jabalpur

ANNEXURE-VII (A)

PRICE VARIATION CLAUSE FOR TRANSFORMERS WITH ALUMINIUM WINDING

The price quoted/confirmed is based on the input cost of raw materials/components and labour cost as on the date of quotation and the same is deemed to be related to prices of raw materials and all India average consumer price index number for industrial workers as specified in the price variation clause given below. In case of any variation in these prices and index numbers, the price payable shall be subject to adjustment, up or down in accordance with the following formula :-

$$P = \frac{P_0}{100}\left(13 + 17\frac{AL}{AL_0} + 33\frac{ES}{ES_0} + 9\frac{IS}{IS_0} + 5\frac{IM}{IM_0} + 11\frac{TB}{TB_0} + 12\frac{W}{W_0}\right)$$

Wherein,

P = Price payable as adjusted in accordance with the above formula.

P_0 = Price quoted /confirmed

AL_0 = Price of EC Grade Aluminium Rods (Properzi Rods)(refer notes). This price is as applicable on the first working day of the month, **one** month prior to the date of tendering.

ES_0 = C&F price of CRGO `M4' grade Electrical Steel Sheets (refer notes). This price is as applicable on the first working day of the month, **one** month prior to the date of tendering.

IS_0 = Wholesale price index number for `Iron & Steel (Base :1993-94=100)' (refer notes). This index number is as applicable for the week ending 1st Saturday of the month, **three** month prior to the date of tendering.

IM_0 = Price of Insulating Materials (refer notes). This price is as applicable on the first working day of the month, **one** month prior to the date of tendering.

TB_0 = Price of Transformer Oil Base stock (refer notes). This price is as applicable on the 1st working day of the month, **two** month prior to the date of tendering

W_0 = All India average consumer price index number for Industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base 1982=100). This index number is as applicable on the 1st working day of the month, **three** month prior to the date of tendering.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA (PVC)/TRF/_/_ prevailing as on first working day of the month **one** month prior to the date of tendering.

AL = Price of EC Grade Aluminium Rods (Properzi Rods)(refer notes).
This price is as applicable on the first working day of the month, one month prior to the date of delivery.

ES = C&F price of CRGO `M4' grade Electrical Steel Sheets (refer notes).
This price is as applicable on the first working day of the month, **one** month prior to the date of delivery.

IS = Wholesale price index number for `Iron & Steel (Base :1993-94=100)' (refer notes).
This index number is as applicable for the week ending 1st Saturday of the month, **three** month prior to the date of delivery

IM = Price of Insulating Materials (refer notes). This price is as applicable on the first working day of the month, **one** month prior to the date of delivery.

TB = Price of Transformer Oil Base stock (refer notes).
This price is as applicable on the 1st working day of the month, **two** month prior to the date of delivery.

W = All India average consumer price index number for Industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base 1982=100). This index number is as applicable on the 1st working day of the month, **three** month prior to the date of delivery.

The date of delivery is the date on which the transformer is notified by the manufacture as being ready for inspection / despatch. The above prices and indices are as published by IEEMA vide circular reference number IEEMA (PVC)/TRF/_/_ prevailing as on first working day of the month **one** month prior to the date of delivery.

NOTES :

(a) All prices of raw materials are exclusive of modvatable excise /CV duty amount and exclusive of any other central, state or local taxes, octroi etc., transformers manufacturers import major raw materials like CRGO, Steel Sheets, TOBS and Insulating press Discom-EZs etc. The landed cost of these imported raw materials includes applicable customs duty but exclusive of modvatable CVD.

(b) All prices are as on first working day of the month.

(c) The details of prices are as under :-

1. The price of Aluminium in Rs/MT is the average Ex-works price of EC Grade Aluminium Rods quoted by primary producers conforming to specification IS: 5484-1978.

2. The price of CRGO `M4' grade Electrical Steel Sheets (in Rs/MT) is the average C&F price in US $ as per MT converted into Indian Rupees with applicable exchange rte prevailing as on 1st working day of the month, as quoted by primary producers. This price is the landed cost, inclusive of applicable customs duty only but exclusive of countervailing duty.

3. The Wholesale price index number for `Iron & Steel' is as published by the Office of Economic Advisor, Ministry of Industry, Govt. of India, New Delhi with base 1993-94=100. This wholesale price index number is being published weekly on provisional basis. However, the same gets finalized after eight weeks and is normally available after two months. Therefore, we are considering in our calculations this final index for the first Saturday of the months, two months prior to the date of which the prices of other raw materials such as Al, IM are published for the corresponding month.

4. The average price of Insulating material (in Rs/kg) of pre-compressed press Discom-EZs of size 3 mm and 10 mm thick, 3200 mm x 4100 mm C&F price in free currency per MT converted into Indian Rupees with applicable exchange rates prevailing as on 1st working day of the month, as quoted by primary suppliers. This price is the landed cost, inclusive of applicable customs duty only but exclusive of countervailing duty.

5. The price of TOBS is C&F price (in Rs/K.Ltr) of Group – II 70 grade Oil as published for the 1st week of the previous month. This price is normally published in US $ per US Gallon, which is converted in Rs/K.Ltr with applicable exchange rate prevailing on 1st working day of the subsequent month. This price is the landed cost, inclusive of applicable customs duty only but exclusive of countervailing duty.

(d) Some purchasers are purchasing oil immersed transformers from manufacturers without first filling of oil. Oil for first filling is procured and filled by the purchasers. For such supplies PVC formula, excluding Oil will apply as under:-

$$P = \frac{P_0}{89}\left(13 + 17\frac{AL}{AL_0} + 33\frac{ES}{ES_0} + 9\frac{IS}{IS_0} + 5\frac{IM}{IM_0} + 12\frac{W}{W_0}\right)$$

Where description of P, P_0 , AL, ES, IS, IM and W etc. remains same as mentioned earlier.

Chief Engineer (S&P-EZ)
MPPKVVCL : Jabalpur

ANNEXURE -VIII (B)

PRICE VARIATION CLAUSE FOR TRANSFORMERS WITH COPPER WINDING

The price quoted/confirmed is based on the input cost of raw materials/components and labour cost as on the date of quotation and the same is deemed to be related to prices of raw materials and all India average consumer price index number for industrial workers as specified in the price variation clause given below. In case of any variation in these prices and index numbers, the price payable shall be subject to adjustment, up or down in accordance with the following formula :-

$$P = \frac{P_0}{100}\left(13 + 23\frac{C}{C_0} + 27\frac{ES}{ES_0} + 9\frac{IS}{IS_0} + 5\frac{IM}{IM_0} + 11\frac{TB}{TB_0} + 12\frac{W}{W_0}\right)$$

Wherein,

P = Price payable as adjusted in accordance with the above formula.

P_0 = Price quoted /confirmed.

C_0 = Average LME settlement price of copper wire bars (refer notes).
This price is as applicable for the month, **two** months prior to the date of tendering.

ES_0 = C&F price of CRGO `M4' grade Electrical Steel Sheets (refer notes).
This price is as applicable as on 1st working day of the month, **one** month prior to the date of tendering.

IS_0 = Wholesale price index number for 'Iron & Steel (Base :1993-94=100)' (refer notes).
This index no. is as applicable for the week ending 1st Saturday of the month, **three** months prior to the date of tendering.

IM_0 = Price of Insulating Materials (refer notes).
This price is as applicable as on 1st working day of the month, **one** month prior to the date of tendering.

TB_0 = Price of Transformer Oil Base stock (refer notes)
This price is as applicable on the 1 working day of the month, **two** months prior to the date of tendering

W_0 = All India average consumer price index number for Industrial workers, as published by Labour Bureau, Ministry of Labour, Govt. of India(Base 1982=100).
This index no. is as applicable on the 1st working day of the month, **three** months prior to the date of tendering.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA (PVC)/TRF/_/_ prevailing as on first working day of the month **one** month prior to the date of tendering.

C = Average LME settlement price of copper wire bars (refer notes).
This price is as applicable for the month, **two** months prior to the date of delivery.

ES = C&F price of CRGO 'M4' grade Electrical Steel Sheets (refer note).
This price is as applicable on the 1st working day for the month, **one** month prior to the date of delivery.

IS = Wholesale price index number for Iron & Steel (Base : 1993-94=100)' (refer notes).
This index no. is as applicable for the week ending 1st Saturday of the month, **three** months prior to the date of delivery.

IM = Price of Insulating Materials (refer notes).

This price is as applicable for the month, **one** months prior to the date of delivery.

TB = Price of Transformer Oil Base Stock (refer notes)
This price is as applicable for the month, **two** months prior to the date of delivery

W = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour Govt. of India (Base 1982=100).
This index no. is as applicable on the 1st working day of the month, **three** months prior to the date of delivery.

The date of delivery is the date on which the transformer is notified by the manufacture as being ready for inspection / despatch. The above prices and indices are as published by IEEMA vide circular reference number IEEMA (PVC)/TRF/_/_ prevailing as on first working day of the month **one** month prior to the date of delivery.

NOTES :

(a) All prices of raw materials are exclusive of modvatable excise /CV duty amount and exclusive of any other central, state or local taxes, octroi etc. Transformer manufacturers import major raw materials like Copper, CRGO, steel sheets, TOBS and insulating pressboards etc. The landed cost of these imported raw materials includes applicable custom duty but exclusive of modvatable CVD.

(b) All prices are as on first working day of the month.

(c) The details of prices are as under:-

1. The LME price of Copper Wire Bars (in Rs/MT) is the LME average settlement price of Copper Wire Bars for one month prior to the month of the circular converted into Indian Rupees with applicable exchange rates prevailing as on 1st working day of the subsequent month. This price is the landed cost, inclusive of applicable custom duty only but exclusive of countervailing duty.

2. The price of CRGO `M4' grade Electrical Steel Sheets (in Rs/MT) is the average C&F price in US $ per MT converted into Indian Rupees with applicable exchange rate prevailing as on 1st working day of the month, as quoted by primary producers. This price is the landed cost, inclusive of applicable custom duty only but exclusive of countervailing duty.

3. The Wholesale price index number for `Iron & Steel' is as published by the Office of Economic Advisor, Ministry of Industry, Govt. of India, New Delhi with base 1993-94=100. This wholesale price index number is being published weekly on provisional basis. However, the same gets finalized after eight weeks and is normally available after two months. There, we are considering in our calculations this final index for the first Saturday of the months two months prior to the date of which the prices of other raw materials such as Al, IM are published for the corresponding month.

4. The average price of Insulating material (in Rs/kg) of pre-compressed pressboards of size 3 mm and 10 mm thick, 3200 mm x 4100 mm C&F price in free currency per MT converted into Indian Rupees with applicable exchange rates prevailing as on 1st working day of the month,

as quoted by primary suppliers. This price is the landed cost, inclusive of applicable custom duty only but exclusive of countervailing duty.

5. The price of TOBS is C&F price (in Rs/K.Ltr) for Group – II 70 grade Oil as published for the 1st week of the previous month. This price is normally published in US $ per US Gallon, which is converted in Rs/K.Ltr with applicable exchange rate prevailing on 1st working day of the subsequent month. This price is the landed cost, inclusive of applicable custom duty only but exclusive of countervailing duty.

(d) Some purchasers are purchasing oil immersed transformers from manufacturers without first filling of oil. Oil for first filling is procured and filled by the purchasers. For such supplies PVC formula, excluding Oil will apply as under:-

$$P = \frac{P_0}{89}\left(13 + 23\frac{C}{C_0} + 27\frac{ES}{ES_0} + 9\frac{IS}{IS_0} + 5\frac{IM}{IM_0} + 12\frac{W}{W_0}\right)$$

Where, description of P, P_0 , AL, ES, IS, IM and W etc. remains same as mentioned earlier.

Chief Engineer (S&P-EZ)
MPPKVVCL : Jabalpur

ANNEXURE-X

LIST OF CONSIGNEE AREA STORES &
SENIOR / REGIONAL ACCOUNTS OFFICERS
(For the items other than General stationery/General printed stationery/Drawing Articles etc.)

S.No.	Name of Consignee	Name of Station to which Materials are to be despatched, if by Railway.	Concerned Sr.AO / R.A.O. MPSEB
1	Addl.S.E./ E.E.(Stores) Area Store, MPSEB, Jabalpur	Jabalpur (W-C.R.)	Jabalpur
2	-do- Sagar	Sagar (W-C.R.)	Sagar
3	-do- Satna	Satna (W-C.R.)	Rewa
4	-do- Chhatarpur	Harpalpur (W-C.R.)	Chhatarpur
5	-do- Chhindwara	Chhindwara (S.E.R.)	Chhindwara

ANNEXURE-IX

LIST OF SCHEDULED BANKS

S.No.	Name of R.A.O. / Sr.A.O	Name of Bank	
1	JABALPUR	(i)	State Bank of India, Nayagaon Branch
		(ii)	State Bank of India
		(iii)	MP State Co-operative Bank
		(iv)	Punjab National Bank.
2	SAGAR	(i)	Bank of India
		(ii)	State Bank of India
3	CHHINDWARA	(i)	State Bank of India
4	REWA	(i)	State Bank of India
		(ii)	Punjab National Bank.
		(iii)	Allahabad Bank
5	CHHATARPUR	(i)	State Bank of India.