

# THE WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED

(A Govt. of West Bengal Enterprise)

OFFICE OF THE GENERAL MANAGER  
SANTALDIH THERMAL POWER STATION

P.O. - SANTALDIH THERMAL PLANT

DIST. PURULIA - 723 146

Tel. No. 03251 260 218 / Fax No. 03251 260 217



**((Tender Notice for Website))**

**NIT No.: WBPDC/Adv-Tend/CC/15-16/118/STPS** **Date: 04.08.2015**

**Tender Ref. No. : STPS/M&C/Press Tender/383/EM(OPH)/14-15/359** **Date: 30.07.2015**

Tenders are invited from eligible, experienced and resourceful manufacturers only working under Govt. Organizations / Semi Govt. Organizations / PSUs / Power Utilities for procurement of 750 kVA (33 kV/415 V) & 500 kVA (11 kV/433 V) Transformers under EM(OPH) Dept., Santaldih T.P.S. as per item description mentioned below:

**Name of the Procurement:** Procurement of 750 kVA (33 kV/415 V) & 500 kVA (11 kV/433 V) Transformers under EM(OPH) Dept., Santaldih T.P.S.

Sl. No.	Item Code	Item Description	Quantity	Order Unit
1	04T051028	Outdoor type Oil filled Transformer with Off-load Tap Changer. 750 kVA, Primary Voltage - 33000 Volt. Secondary Voltage - 415 Volt, Primary Current - 13.12 Amp, Secondary Current - 1043 Amp. Vector group - Dyn11, 3 Phase, 50 Hz. <b>FITTINGS &amp; ACCESSORIES</b> 1. Conservator with Oil Level Indicator, Oil filling Holes and Drain Plug 2. Two Nos. Earthing Terminals 3. Ratings & Diagram Plate 4. Air Release Plug 5. Lifting Lug 6. Off circuit Tap Changer 7. Silica Gel Breather 8. Four Nos. Plain Rollers 9. Drain Valve & Filter Valve 10. Radiators 11. Single Diaphragm Explosion Vent.	01	NO
2	04T050986	500KVA, 11,000/433V, Dyn11, Outdoor type Copper wound Distribution Transformer complete Set as per IS, Primary Current - 26.25 Amp, Secondary Current - 666.7 Amp. <b>FITTINGS &amp; ACCESSORIES</b> 1. Conservator with Oil Level Indicator, Oil filling Holes and Drain Plug 2. Two Nos. Earthing Terminals 3. Ratings & Diagram Plate 4. Air Release Plug 5. Lifting Lug 6. Off circuit Tap Changer 7. Silica Gel Breather 8. Four Nos. Plain Rollers 9. Drain Valve & Filter Valve 10. Radiators 11. Single Diaphragm Explosion Vent.	01	NO

**Information to the bidders:** This is a three part bidding system containing **Earnest Money (Part-I), Qualifying Requirements (Part-II) and Price Bid (Part-III)**. Tenders will be received and evaluated by Santaldih T.P.S., the

WBPDCCL from technical and financial point of view to make the best selection for the interest of the WBPDCCL for the complete procurement covered under the Tender Document. Material specification and other Technical particulars are as per **Annexure-A**. Other Terms & Conditions in detail will be mentioned in the Tender Document.

**Earnest Money:** The Earnest Money of **Rs. 55,000/-** (Rupees Fifty Five Thousand only) shall be deposited along with Tender Document in the form of Bank Draft/Pay Order issued by any nationalized Bank from India in favour of **“THE WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED”** payable at United Bank of India, Santaldih branch or State Bank of India, Purulia branch or payable at Kolkata for other Banks. Govt. Organizations/Undertakings, NSIC/SSI Units are exempted from submission of Earnest Money. Necessary certificate is to be submitted for NSIC/SSI units.

**Estimated Cost:** Around **Rs. 15,60,000/-** (Rupees Fifteen Lac Sixty Thousand only)

**Cost of Tender Document:** **Rs. 1,600/-** (Rupees One Thousand Six Hundred only)

**Qualifying Requirements (Q.R.):**

- 1) The bidder must be an original equipment manufacturer of the tendered items.
- 2) The offered items should have been type-tested for Short Circuit & Impulse Voltage Withstand at CPRI / NABL accredited laboratory. The bid shall accompany with type-test reports conducted at CPRI / NABL accredited laboratory for the quoted items conducted within 05 (Five) years before opening of the tender.
- 3) Experience of having successfully completed similar supply in any Govt. Organization / Semi Govt. Organization / PSU / Power Utilities during last 07 (Seven) years ending 30<sup>th</sup> June, 2015 must be either of the following:
  - a) One similar completed supply order costing not less than the amount equal to 80% of the estimated cost i.e. Rs. 12,48,000/- (Rupees Twelve Lac Forty Eight Thousand only)
  - Or,
  - b) Two similar completed supply orders each costing not less than the amount equal to 50% of the estimated cost i.e. Rs. 7,80,000/- (Rupees Seven Lac Eighty Thousand only)
  - Or,
  - c) Three similar completed supply orders each costing not less than the amount equal to 40% of the estimated cost i.e. Rs. 6,24,000/- (Rupees Six Lac Twenty Four Thousand only).
 Here, **‘Similar Supply’** means supply of Transformers with Size / Voltage Rating same or higher.
- 4) The average annual turnover of the bidder during the last 03 (Three) years, ending 31<sup>st</sup> March of the previous financial year, should be at least 30% of the estimated cost.
- 5) The bidder shall submit copies of relevant purchase order(s) & other documentary evidence as proof of satisfactory completion of similar supply & delivery.

Legible photocopies of all the documents as stated below countersigned by the tenderer need to be submitted accordingly in a separate sealed envelope super-scribing **‘Qualifying Requirements’, Tender Notice No. with date, Due date of Opening** and **‘Name of the Procurement’**, otherwise the tender will be treated as invalid. Original copies of the documents are to be produced on demand.

- a) Credentials regarding Qualifying Requirements (e.g. Purchase Orders etc.),
- b) P&L Account and Balance Sheets for last 03 (Three) years,
- c) PAN Card,
- d) VAT/CST Return,
- e) Trade License.

**Important Dates:**

<b>Sale of Tender Document:</b>	From 04.08.2015 up to 17.08.2015 between 11:00 Hrs. and 14:30 Hrs.	
<b>Last Date of Offer Submission:</b>	24.08.2015 within 15:00 Hrs.	
<b>Opening of Tender:</b>	Part I & II	24.08.2015 at 15:15 Hrs.
	Part III	24.08.2015 or later duly intimated to the bidders.

**Sale of Tender Document:**

Tenders Document shall be obtained from Sr. Manager (M&C), STPS or his authorized representative against written application in duplicate on any working day except Saturday and holiday between 11:00 Hrs. and 14:30 Hrs. after

deposit the cost against the Tender Document at Cash counter, S.T.P.S. by cash only. Tender paper must be sold by each of the applicants.

**Opening of Tender:**

- a) The tenders shall be opened in presence of representative of the prospective bidders, if available, at the time and date set for opening of tender as mentioned above. In case any extension has been given thereto on the extended tender opening date and time will be notified to all the prospective bidders who have purchased the Tender Documents. Authorized representatives (maximum two persons) of the prospective bidder may attend the opening.
- b) After opening the main cover, the envelope containing E.M.D. (Part-I) shall be opened first and if E.M.D. of requisite amount in proper mode is found the Q.R. (Part-II) will be opened.
- c) Price Bid (Part-III) of the prospective bidders who have qualified in both Part-I & Part-II will be considered only by the WBPDCCL for subsequent opening of Part-III on same or later date eliminating other participants.

**Evaluation of Tender:**

- a) Issuance of tender document to the participants will not qualify him automatically for the entire tender process.
- b) The WBPDCCL reserves the right to itself to accept any tender or reject any or all tenders or cancel / withdraw the invitation for tender without assigning any reason for such decision. Such decision by the WBPDCCL shall not be subject to question by any prospective bidder and the WBPDCCL shall bear no liability consequent upon such decision and the prospective bidders shall have no claim in this regard against the WBPDCCL.
- c) Evaluation by the WBPDCCL shall be based on the information and documentary evidence submitted by the prospective bidders in response to the tender documents. The requirements as stipulated in the tender notice and documents are the minimum and the WBPDCCL has the right to request for additional information. The WBPDCCL reserves the right to reject any tender, if in the opinion of the WBPDCCL the qualification data / documentary evidence submitted by the prospective bidders are incomplete or prospective bidders are found not qualified to satisfactorily perform the job. The WBPDCCL reserve the right to reject any tender if the prospective bidder is found to be disqualified by giving incorrect and / or false information.
- d) The WBPDCCL does not bind itself to accept the lowest tender and also reserves the right to split the procurement amongst more than one prospective bidder and also reserves the right to reject any or all tender or cancel the tender without assigning any reason whatsoever.
- e) Notwithstanding, anything stated above or elsewhere, the WBPDCCL reserves the right to assess the capability and capacity of the prospective bidders, should the circumstances warrant such assessment in the overall interest of the WBPDCCL.

**Encl:** 1) Annexure-A

Sd/-  
(S. Maity)  
**General Manager**  
**STPS, The WBPDCCL**

## ANNEXURE-A

### STANDARD TECHNICAL SPECIFICATION FOR OUTDOOR TYPE THREE PHASE 33 kV/415 V & 11 kV/433 V DISTRIBUTION TRANSFORMERS

#### 1. SCOPE:

- ❖ This specification covers engineering, manufacture, assembly, stage testing, inspection and testing before supply and delivery at site of Oil immersed, naturally cooled 3 Phase 33 kV/415 V and 11 kV/433 V Distribution Transformers for outdoor use.
- ❖ It is not the intent to specify completely herein all the details of the design and construction of the equipment. However, the equipment shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation up to the bidder's guarantee. The offered equipment shall be completed with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of the bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.
- ❖ The standard ratings shall be 750 kVA and 500 kVA.

#### 2. STANDARDS:

The materials shall conform in all respects to the relevant Indian Standard Specification, with latest amendments thereof, some of them are listed below:

<b>Indian Standard</b>	<b>Title</b>
ISS - 2026/1977	Specification for Power Transformer
IS - 12444	Specification for Copper Wire Rod
IS - 335	Specification for Transformer Oil
IS - 5	Specification for Colors for Ready Mixed Paints
IS - 104	Ready Mixed Paint, Brushing Zinc Chromate, Priming
IS - 2099	Specification for High Voltage Porcelain Bushing
IS - 649	Testing for Steel Sheets and Strips and Magnetic Circuits
IS - 4257	Dimensions for Clamping Arrangements for Bushings
IS - 7421	Specification for Low Voltage Bushings
IS - 3347	Specification for Outdoor Bushings
IS - 5484	Specification for Al Wire Rods
IS - 9335	Specification for Insulating Kraft Paper
IS - 1576	Specification for Insulating Press Board
IS - 6600	Guide for Loading of Oil Immersed Transformers
IS - 2362	Determination of Water Content in Oil for Porcelain Bushing of Transformer
IS - 6162	Paper Covered Aluminium Conductor
IS - 6160	Rectangular Electrical Conductor for Electrical Machines
IS - 5561	Electrical Power Connector
IS - 6103	Testing of Specific Resistance of Electrical Insulating Liquids
IS - 6262	Method of Test for Power Factor and Dielectric Constant of Electrical Insulating Liquids
IS - 6792	Determination of Electrical Strength of Insulating Oil
IS - 10028	Installation and maintenance of Transformers
ISS - 3401	Silica Gel
ISS -1866	Code of Practice for Maintenance & Supervision of Mineral Insulating Oil in Equipment
IS - 1180 (Part-I)	In Compliance of Quality Control

Material conforming to other internationally accepted standards, which ensure equal or higher quality than the standards mentioned above, would also be acceptable. In case the bidders who wish to offer material conforming to the other standards, salient points of difference between the standards adopted and the specific standards shall be clearly brought out in relevant schedule. However, in the event of any conflict between the requirements of the International Standards or Codes and the requirements of the BIS Standard or Codes, the latter shall prevail.

### 3. **SYSTEM DETAILS:**

The Transformers shall be suitable for outdoor installation with 3 Phase 50 Hz, 33 kV & 11 kV system in which the neutral is effectively earthed and they should be suitable for service under fluctuations in supply Voltage up to (+10)% to (-15)%.

### 4. **SERVICE CONDITIONS:**

The Distribution Transformers to be supplied against this specification shall be suitable for satisfactory continuous operation under the following climatic conditions as per IS - 2026 (Part - I) Latest Revision:

Location: Santaldih Thermal Power Plant, Purulia, West Bengal

Max. Ambient Air Temperature ( $^{\circ}$ C): 50

Min. Ambient Air Temperature ( $^{\circ}$ C): 3

Max. Average Daily Ambient Air Temperature ( $^{\circ}$ C): 45

Max. Yearly Weighed Average Ambient Temperature ( $^{\circ}$ C): 40

Maximum Relative Humidity: 0 to 100%

Average Thunder Storm Days/Annum: 45 Nos.

Number of Months of Tropical Monsoon: 3 Months.

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

### 5. **PRINCIPAL PARAMETERS:**

The Transformer shall conform to the following specific parameters:

Sl. No.	Item	Specification	
1	Continuous Rated Capacity	750 kVA	500 kVA
2	System Voltage (Max.)	36 kV	12 kV
3	Rated Voltage HV	33 kV	11 kV
4	Rated Voltage LV	415 V	433 V
5	Line Current HV	13.12 A	26.25 A
6	Line Current LV	1043 A	666.7 A
7	Frequency	50 Hz	50 Hz
8	No. of Phases	03 (Three)	03 (Three)
9	Vector Group	Dyn11	Dyn11
10	Connection HV	Delta	Delta
11	Connection LV	Star (Neutral brought out)	Star (Neutral brought out)
12	Type of Cooling	ONAN	ONAN
13	Tap Changing Arrangement	Required (05 Nos. of Steps)	Required (05 Nos. of Steps)
14	Noise Level at Rated Voltage and Frequency	57 Decibel	56 Decibel
15	Permissible Temperature Rise over Ambient	40 $^{\circ}$ C	40 $^{\circ}$ C
16	Minimum Clearances in Air of Bushing Terminals with Connectors fitted:		
16 (a)	HV Phase to Phase / Phase to Earth (mm)	330 / 280	330 / 280
16 (b)	LV Phase to Phase / Phase to Earth (mm)	75 / 55	75 / 55
16 (c)	LV Phase to Neutral (mm)	75	75
16 (d)	LV Neutral to Earth (mm)	55	55

### 6. **CRGO MATERIAL:**

❖ The Core shall be stack type generally of High Grade Cold Rolled Grain Annealed Steel Lamination having low loss and good grain properties, coated with Hot Oil proof insulation, bolted together and to the frames firmly to prevent vibration or noise. The complete design of Core must ensure permanency of the Core losses with continuous working of the Transformers. The value of the maximum Flux Density allowed in the design and grade of lamination used shall be clearly stated in the Offer.

❖ Core Clamping for CRGO Stacked Core:

- MS Channel shall be used on top and bottom.

- Core Channel on LV side to be reinforced at equidistance, if holes/cutting is done for LT lead in order to avoid bending of Channel.
- MS Channels shall be painted with Oil-resistant paint.
- Clamping & Tie-rods shall be made of HT Steel and shall be parkarized.
- ❖ The Transformer's Core shall be suitable for over fluxing (due to combined effect of Voltage and Frequency) up to 12.5% without injurious heating at full load conditions and shall not get saturated. The bidder shall furnish necessary design data in support of this situation.
- ❖ No-load Current shall not exceed 3% of Full-load Current and will be measured by energizing the Transformer at 433 Volts, 50 c/s on the secondary. Increase of Voltage of 433 Volts by 12.5% shall not increase the No-load Current by Max. 6% of Full-load Current. Test for magnetic balance by connecting the LV Phase by Phase to Rated Phase Voltage and measurement of 'an', 'bn', 'cn' Voltage will be carried out.

**7. WINDINGS:**

- ❖ HV and LV Windings shall be wound from Super Enamel covered / Double Paper covered Copper Conductor/Foil.
- ❖ LV Winding shall be such that neutral formation will be at top.
- ❖ The Winding construction of single HV Coil wound over LV Coil is preferable.
- ❖ Inter layer insulation shall be Nomex/Epoxy dotted Kraft Paper.
- ❖ Proper bonding of inter layer insulation with the Conductor shall be ensured. Test for bonding strength shall be conducted.
- ❖ Dimensional tolerances for Winding Coils shall be within limits as specified in Guaranteed Technical Particulars.
- ❖ Current Density for HV and LV Winding should not be more than 2.8 Ampere per sq mm for Copper.
- ❖ The Core/Coil assembly shall be securely held in position to avoid any movement under Short Circuit conditions.
- ❖ Joints in the Winding shall be avoided. However, if jointing is necessary the joints shall be properly brazed and the Resistance of the joints shall be less than that of parent Conductor. In case of Foil Windings, Welding of Leads to Foil can be done within the Winding.

**8. TAPS:**

- ❖ Tapings shall be provided on the higher Voltage Winding for variation of HV Voltage within range of (+5.0) % to (-15.0)% in steps of 2.5%.
- ❖ 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 2.5% 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 number of Tap.

**9. OIL:**

- ❖ The Insulating Oil shall comply with the requirements of IS - 335 or BS - 148.
- ❖ Use of recycled Oil is not acceptable. The Specific Resistance of the Oil shall not be less than  $2.5 \times 10^{12}$  Ohm-cm at 27°C when tested as per IS - 6103.
- ❖ Oil shall be filtered and tested for Break Down Voltage (BDV) and Moisture Content before filling.
- ❖ The Oil shall be filled under vacuum.
- ❖ The design and all materials and processes used in the manufacture of the Transformer, shall be such as to reduce to a minimum the risk of the development of Acidity in the Oil.

**10. INSULATION LEVELS:**

Sl. No.	Voltage (kV)	Impulse Voltage (kV Peak)	Power Frequency Voltage (kV)
1	0.433	-	3
2	11	95	28
3	33	170	70

**11. LOSSES:**

The bidder shall guarantee individually the No-load loss and Load loss without any positive tolerance. The bidder shall also guarantee the total losses at 50% and 100% load condition (at rated Voltage and Frequency and at 75°C).

## 12. PERCENTAGE IMPEDANCE:

The value of Percentage Impedance of Transformers at 75°C shall be in accordance with IS - 2026.

## 13. INSULATION MATERIAL:

- ❖ Electrical grade insulation Epoxy dotted Kraft Paper/Nomex and Pressboard of standard make or any other superior material, subject to approval of the WBPDC, shall be used.
- ❖ All Spacers, Axial Wedges / Runners used in Windings shall be made of pre-compressed Pressboard-solid, conforming to type B 3.1 of IEC 641-3-2. In case of cross-over Coil Winding of HV all Spacers shall be properly sheared and dovetail punched to ensure proper locking. All Axial Wedges / Runners shall be properly milled to dovetail shape so that they pass through the designed Spacers freely. Insulation shearing, cutting, milling and punching operations shall be carried out in such a way, that there should not be any burr and dimensional variations.

## 14. TANK:

- ❖ The Transformer Tank can be with radiator Fins/ rounded or elliptical Cooling Tubes.
- ❖ The Transformer Tank shall be of robust construction rectangular in shape and shall be built up of tested MS Sheets.
- ❖ The internal clearance of Tank shall be such that, it shall facilitate easy lifting of Core with Coils from the Tank.
- ❖ All joints of Tank and fittings shall be Oil tight and no bulging should occur during service.
- ❖ The Tank design shall be such that the Core and Windings can be lifted freely. The Tank plate shall be of such strength that the complete Transformers when filled with Oil may be lifted bodily by means of Lifting Lugs. Inside of Tank shall be painted with Hot Oil resistant Paint.
- ❖ Manufacturer should carry out all welding operations as per the relevant ASME Standards.
- ❖ The four walls of the Tank shall be made of two “L” shaped sheets or one sheet “II” shaped and one straight (without joints) fully welded at the only two corners from inside and outside of the Tank for withstanding a pressure of 0.8 kg/cm<sup>2</sup> for 30 minutes.
- ❖ Top cover plate shall be slightly slopping approx. 10 mm towards HV Bushing and ends of cover plate shall be bent to 90° downwards so as to avoid entry of water through the cover plate Gasket.
- ❖ The Tank shall further be capable of withstanding a pressure of 0.8 kg/sq.cm(g) and a vacuum of 0.3 kg/sq.cm(g) without any deformation.
- ❖ Under operating conditions the pressure generated inside the Tank should not exceed 0.4 kg/sq.cm positive or negative. There must be sufficient space from the Core to the top cover to take care of Oil expansion. The space above Oil level in the Tank shall be filled with dry air or nitrogen conforming to commercial grade of IS -1747.
- ❖ The cover of the main Tank shall be provided with an Air Release Plug.
- ❖ The Radiators can be tube type or fin type to achieve the desired cooling to limit the Specified Temperature rise. The Transformer shall be capable of giving continuous rated output without exceeding the Specified Temperature rise.
- ❖ Lifting Lugs: 4 Nos. welded heavy duty Lifting Lugs of MS plate 10 mm thick (min) suitably reinforced by vertical supporting flat welded edgewise below the Lug on the side wall.
- ❖ Pulling Lugs: 4 Nos. of welded heavy duty Pulling Lugs of MS plate 10 mm thick (min) shall be provided to pull the Transformer horizontally.
- ❖ Top cover fixing Bolts of G.I. adequately spaced and 6 mm Neoprene bonded Cork Gaskets conforming to IS - 4253 part-II shall be placed between Tank and Cover. The Bolts outside Tank shall have 2 flat Washers & one spring Washer.
- ❖ ***Both the HV & LV Winding Bushings shall be provided at the top of the Transformer. The LV Winding of 750 kVA Transformer will be connected to the existing bus-duct. Hence necessary arrangement must have been provided in case of 750 kVA Transformer (The successful bidder may clarify the dimensions of the existing bus-duct after placement of the Order).***

## 15. CONSERVATOR:

- ❖ The Transformers are must have fitted with Conservator Tanks and Buchholz Relays.
- ❖ The Conservator Tank must be provided with Oil Gauge, Dehydrating Breathing Device, Drain Plug, an Air Release Plug etc.
- ❖ The capacity of a Conservator Tank shall be designed to contain 10% of the total quantity of Oil. Normally 3% quantity the Oil shall be contained in the Conservator.
- ❖ The inside diameter of the pipe connecting the Conservator to the main Tank should be within 20 to 50 mm and it should be projected into the Conservator so that its end is approximately 20 mm above the bottom of the

Conservator so as to create a sump for collection of impurities. The minimum Oil level (corresponding to -5°C) should be above the sump level.

**16. BREATHER:**

Breather shall be screwed type. It shall have clear view glass type. Volume of Breather shall be suitable for 0.5 Kg. of Silica Gel.

**17. SURFACE PREPARATION & PAINTING:**

❖ **GENERAL**

- All paints shall be applied in accordance with the paint manufacturer's recommendations.
- All paints, when applied in a normal full coat, shall be free from runs, sags, wrinkles, patchiness, brush marks or other defects.
- All primers shall be well marked into the surface, particularly in areas where painting is evident and the first priming coat shall be applied as soon as possible after cleaning. The paint shall be applied by airless spray according to manufacturer's recommendations. However, where ever airless spray is not possible, conventional spray be used with prior approval of the WBPDCCL.

❖ **CLEANING AND SURFACE PREPARATION**

- After all machining, forming and welding has been completed, all steel work surfaces shall be thoroughly cleaned of rust, scale, welding slag or spatter and other contamination prior to any painting.
- Steel surfaces shall be prepared by shot blast cleaning (IS - 9954) to grade Sq. 2.5 of ISO 8501-1 or chemical cleaning including phosphating of the appropriate quality (IS - 3618).
- Chipping, Scraping and Steel Wire Brushing using manual or power driven tools cannot remove firmly adherent mill-scale. These methods shall only be used where blast cleaning is impractical. Manufacturers have to clearly explain such areas in his technical Offer.

❖ **PROTECTIVE COATING**

- As soon as all items have been cleaned and within four hours of the subsequent drying, they shall be given suitable anti-corrosion protection.

❖ **PAINT MATERIAL**

- For inside surface heat resistant paint (Hot Oil proof) shall be used.
- For external surfaces one coat of Thermo Setting Powder paint or 1 coats of Zinc Chromate primer followed by 2 coats of Synthetic Enamel / Polyurethane base Paint shall be used. These paints can be either air drying or stoving.
- The color of the finishing coats shall be dark admiral gray confirming to No. 632 of IS-5 of 1961.

❖ **DRY FILM THICKNESS**

The requirements for the Dry Film Thickness (DFT) of paint and the materials to be used shall be as given below:

Sl. No.	Paint Type	Area to be painted	No. of coats	Total Dry Film Thickness (min.)
1	Thermo setting Paint	Inside Outside	01 01	20 microns 60 microns
2	Liquid Paint i) Zinc Chromate (Primer) ii) Synthetic Enamel / Poly Urethane (Finish coat) iii) Hot Oil Paint	Outside Outside Inside	01 02 01	30 microns 25 microns each 35 / 10 microns

**18. BUSHINGS:**

- ❖ The Bushings shall conform to the relevant standards specified and shall be of outdoor type. The Bushing Rods and nuts shall be made of Brass material 12 mm diameter for both HT and LT Bushings. The bushings shall be fixed to the Transformers the top cover for Transformers. The Tests as per latest IS - 2099 and IS - 7421 shall be conducted on the Transformer Bushings.
- ❖ For 33 kV, 52 kV class Bushings shall be used. For 11kV, 33 kV class Bushings and 0.433 kV, 1.1 kV class Bushings shall be used.
- ❖ Bushing can be of porcelain/epoxy material. Polymer Insulator Bushings conforming with relevant IEC can also be used.



- ❖ Dimensions of the Bushings of the Voltage class shall conform to the Standards specified and dimension of clamping arrangement shall be as per IS - 4257.
- ❖ Arcing Horns shall be provided on HV Bushings.
- ❖ Brazing of all inter connections, jumpers from Winding to Bushing shall have cross section larger than the Winding Conductor. All the Brazes shall be qualified as per ASME, Section – IX.
- ❖ The Bushings shall be of reputed make supplied by those manufacturers who are having manufacturing and testing facilities for Insulators.
- ❖ The Terminal arrangement shall not require a separate Oil chamber not connected to Oil in the main Tank.

**19. TERMINAL MARKINGS:**

High Voltage and Low Voltage Phase Windings shall be marked both in the terminal boards inside the Tank and on the outside with capital letter **1U, 1V, 1W** and low Voltage Winding for the same Phase marked by corresponding small letter **2u, 2v, 2w**. The neutral point terminal shall be indicated by the letter **2n**. Neutral terminal to be brought out and connected to local grounding terminal by an Earthing strip.

**20. FITTINGS:**

The following standard fittings shall be provided with the Transformer:

- ❖ Rating and Terminal marking Plates non-detachable
- ❖ Earthing Terminals with Lugs - 2 Nos.
- ❖ Lifting Lugs for Main Tank & Top Cover
- ❖ Terminal Connectors on the HV/LV Bushings
- ❖ Thermometer Pocket with Cap - 1 No.
- ❖ Air Release Device
- ❖ HV Bushings - 3 Nos.
- ❖ LV Bushings - 4 Nos.
- ❖ Pulling Lugs - 4 Nos.
- ❖ Radiators - No. & length may be mentioned (as per heat dissipation calculations)
- ❖ Arcing Horns for HV Bushings
- ❖ Prismatic Oil Level Gauge indicating the position of Oil
- ❖ Drain cum Sampling Valve
- ❖ Oil filling Hole having p. 1- ¼ " thread with Plug and Drain Valve on the Conservator
- ❖ Silica Gel Breather
- ❖ 4 No. Rollers for Transformers
- ❖ Pressure Relief Device or Explosion Vent.

**21. OVERLOAD CAPACITY:**

The Transformers shall be suitable for loading as per IS - 6600 / 1972.

**22. GUARANTEE FOR THE TRANSFORMERS:**

**Guarantee Period shall be 48 months from the date of installation or 54 months from the date of receipt** by the WBPDCCL, whichever is earlier. If any Transformer fails during this Guarantee Period, the bidder shall repair the same at his cost at his works.

**23. TESTS:**

- ❖ All the equipment offered shall be fully type tested by the bidder as per the relevant standards at any Govt. approved lab like ERDA/CPRI. The Type Test must have been conducted on a Transformer of same design. The bidder shall furnish two sets of Type Test Reports along with the Offer. **Offers without type test reports will be treated as Non-responsive.**
- ❖ The Test Certificates for all Type Tests for the Transformers and also for the Bushings and Transformer Oil shall be submitted with the bid.
- ❖ The procedure for testing shall be in accordance with IS - 1180/2026 as the case may be except for Temperature Rise Test.
- ❖ Before despatch each of the completely assembled Transformers shall be subjected to the Routine Tests at the manufacturer's works.

**24. ROUTINE TESTS:**

- ❖ Ratio, Polarity and Phase Sequence
- ❖ No-load Current and Losses at service Voltage and formal Frequency

- ❖ Load-losses at rated Current and normal Frequency
- ❖ Impedance Voltage Test
- ❖ Resistance of Windings at each Tap, cold (at or near the test bed temp.)
- ❖ Insulation Resistance
- ❖ Induced Over Voltage Withstand Test
- ❖ Separate Source Voltage Withstand Test
- ❖ Neutral Current Measurement
- ❖ Oil Samples to comply with IS - 1866
- ❖ Measurement of no-load Losses and Magnetizing Current at rated Frequency and 90%, 100% and 110% Voltage.

**25. TYPE TESTS TO BE CONDUCTED ON ONE UNIT:**

In addition to the above mentioned Routine Tests following Tests shall be conducted:

- ❖ Temperature Rise Test for determining the maximum Temperature rise after continuous full load run. The ambient Temperature and time of test should be stated in the Test Certificate
- ❖ Impulse Voltage Test
- ❖ Air Pressure Test: As per IS - 1180
- ❖ Short Circuit Withstand Test: Thermal and Dynamic ability
- ❖ Magnetic Balance Test
- ❖ Unbalanced Current Test: The value of unbalanced Current indicated by the Ammeter shall not be more than 2% of the Full-load Current
- ❖ Noise-level measurement
- ❖ Measurement of Zero-Phase sequence Impedance
- ❖ Measurement of Harmonics of No-load Current
- ❖ Pressure Relief Device Test ( if provided)
- ❖ Transformer Tank together with its Radiator and other fittings shall be subjected to pressure corresponding to twice the normal pressure or 0.35 kg/sq.cm, whichever is lower, measured at the base of the Tank and maintained for an hour. The permanent deflection of the flat plates after the excess pressure has been released, shall not exceed the figures for Vacuum Test.
- ❖ The WBPDCCL may select the Transformer for Type Tests randomly.

**26. TESTS AT SITE:**

The WBPDCCL reserves the right to conduct all tests on Transformer after arrival at site and the manufacturer shall Guarantee Test Certificate figures under actual service conditions. In order to ensure quality the Acceptance Test shall be carried out even after installation of Transformer within Guarantee Period.

**27. ACCEPTANCE TESTS:**

The Transformers shall be subjected to the following Routine/Acceptance Test in presence of representatives of the WBPDCCL at the place of manufacture before dispatch without any extra charges. The Testing shall be carried out in accordance with IS - 1180 and IS - 2026.

**28. TOLERANCES:**

Unless otherwise specified herein the test value of the Transformers supplied would be within the tolerance permitted in the relevant standards. No positive tolerance is allowed on guaranteed No-load and Load losses.

**29. INSPECTION:**

All tests and inspection shall be made at the place of manufacturer. The manufacturer shall afford the inspector representing the WBPDCCL all reasonable facilities.

**30. PACKING & FORWARDING:**

- ❖ The packing shall be done as per the manufacturer's standard practice. However, it should be ensured that the packing is such that, the material would not get damaged during transit by Rail /Road / Sea.
- ❖ The making on each package shall be as per the relevant IS.

**31. DOCUMENTATION:**

All the Drawings, Test Certificates etc. must be approved by the WBPDCCL before dispatch of the materials.