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**Note:** The bidders, in their own interest are requested to read very carefully Section-I (Instruction to Bidders), Section-II (General Condition of Contract) & Section-III (Technical Specification) before filling the bid. The Bid documents be downloaded from JVVNL website [www.jaipurdiscom.in](http://www.jaipurdiscom.in) . No hard copy of the bidding documents will be provided to the bidders through this office. In case of any discrepancy found in the bidding documents downloaded from the website and appended with the bid (as a bid document) and the original copy of such document available in the office of Superintending Engineer (MM), Jaipur discom, Jaipur then the copy available with Superintending Engineer (MM), Jaipur discom, Jaipur will be considered as final document for all purposes. The cost of Bid document as published in NIT shall be furnished along with downloaded bid document in the manner prescribed in bid document.

**JAIPUR VIDYUT VITARAN NIGAM LIMITED  
(MM CIRCLE)  
OLD POWER HOUSE PREMISES, BANI PARK, JAIPUR -06**

**TELEPHONE: 0141-2202607**

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**BID DOCUMENTS FOR PURCHASE OF 160 KVA, 11/0.433 KV 3 PHASE ALUMINIUM WOUND THREE STAR RATING DISTRIBUTION TRANSFORMERS UNDER SPECIFICATION NO.JPD/SE/MM/SPO-VI/TN-2142.**

S.No	ITEM	QUANTITY
1	160 KVA Rating Distribution Transformers	1140 Nos.

LAST DATE AND TIME FOR : 03.06.2011 up to 2.30 PM  
RECEIPT OF BID

DATE AND TIME OF : 03.06.2011 (AT 3.00PM)  
OPENING OF BID

EARNEST MONEY TO BE DEPOSITED : RS.5,00,000.00(Rs. Five Lac only/  
Exemption Certificate or Vender Registration of class "A" category)

COST OF THE : RS.2500.00(non refundable)  
SPECIFICATION

VALIDITY : 120 DAYS FROM THE NEXT DATE  
OPENING OF TECHNO-COMMERCIAL  
BID.

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**NOTE: The bidders, in their own interest are requested to read very carefully Section-I (Instruction to Bidders), Section-II (General Condition of Contract) & Section-III (Technical Specification) before filling the bid. The Bid documents be downloaded from JVVNL website [www.jaipurdiscom.in](http://www.jaipurdiscom.in) . No hard copy of the bidding documents will be provided to the bidders through this office. In case of any discrepancy found in the bidding documents downloaded from the website and appended with the bid (as a bid document) and the original copy of such document available in the office of Superintending Engineer (MM), Jaipur discom, Jaipur then the copy available with Superintending Engineer (MM), Jaipur discom, Jaipur will be considered as final document for all purposes. The cost of Bid document as published in NIT shall be furnished along with downloaded bid document in the manner prescribed in bid document.**

**JAIPUR VIDYUT VITARAN NIGAM LIMITED**

**OLD POWER HOUSE, NEAR RAM MANDIR, BANI PARK, JAIPUR-302006**

**Phone: 2202607      Fax: (0141) 2202025**

**TECHNICAL SPECIFICATION**

**FOR**

**11/0.433 KV, ALUMINIUM WOUND THREE STAR RATING DISTRIBUTION**

**TRANSFORMERS OF RATING 160 KVA**

**WITH CRGO (STACK/WOUND)/AMORPHOUS CORE**

**AGAINST TN-2142**

**Section - III****TECHNICAL SPECIFICATION FOR SUPPLY OF 11/0.433KV, 160 KVA RATING OUTDOOR TYPE (ALUMINIUM WOUND) THREE STAR RATING DISTRIBUTION TRANSFORMERS AGAINST TN-2142.****1. SCOPE:**

This specification covers the design, engineering, manufacture, assembly, inspection and testing at manufacturer's works before supply and delivery at site of Oil immersed, Oil Natural Air Natural (ONAN) outdoor type 11KV/433 V, three phase, 50 Hz, double wound core type, outdoor Type, Aluminium Wound Three Star Rating Distribution Transformers of 160 KVA rating, complete with fittings and accessories for use in Distribution System.

1.1 The Equipment Offered shall be complete with all parts necessary for their effective and trouble free operation. Such parts will be deemed to be within the scope of the supply irrespective of whether they are specifically indicated in the commercial order or not.

1.1.1 It is not the intent to specify herein complete details of design and construction. The equipment offered shall conform to the relevant standards and be of high quality, sturdy, robust and of good design and workmanship complete in all respects and capable to perform continuous and satisfactory operations in the actual service conditions at site and shall have sufficiently long life in service as per statutory requirements. The dimensional drawings attached with this specification and the notes thereto are generally of illustrative nature. In actual practice, notwithstanding any anomalies, discrepancies, omissions, incompleteness, etc. in these specifications and attached drawings, the design and constructional aspects, including materials and dimensions, will be subject to good engineering practice in conformity with the required quality of the product, and to such tolerances, allowances and requirements for clearances etc. as are necessary by virtue of various stipulation in that respect in the relevant Indian Standards, IEC standards, I.E. Rules, I.E Act and other statutory provisions.

1.2 The Tendered / supplier shall bind him to abide by these considerations to the entire satisfaction of the Purchaser and will be required to adjust such details at no extra cost to the purchaser over and above the tendered rates and prices.

1.3 Tolerances on all the dimensions shall be in accordance with provisions made in the relevant Indian/ IEC standards and in these specifications. Otherwise the same will be governed by good engineering practice in conformity with required quality of the product.

**2. APPLICABLE STANDARDS:**

Unless otherwise modified in the specifications, the Distribution Transformers, including various accessories, shall generally comply with the following Indian Standards / REC Specifications. The standard(s) shall be with latest amendment, if any, from time to time.

**Note:** Wherever ISS are mentioned, equivalent or better International standards are also acceptable

IS:2026 (PART-I,II,III,IV & V)/1981 – Power Transformers

IS:6600/1978 : Guide for loading of oil immersed Transformers

IS:335/1983 : New insulation oils for Transformers

IS:3347 (Part-I/Sec. 1 & 2) : Dimension of Porcelain parts & Metal parts for Transformer bushing (1.1 KV).

IS:3347 (PART-III/Sec-1 & 2) : Dimensions of Porcelain parts & Metal parts for Transformer bushing (17.5 KV).

IS:12444 : Specification for copper wire rod.

IS:7421 : Porcelain Transformer Bushings for low voltage – upto 1 KV.

IS:2099/1986 : Porcelain Transformer bushing for AC volts above 1000 volts.

IS:3639/1966 : Fittings & accessories for Transformers

IS:1866/1978 : Code of practice for maintenance & supervision of insulating oil in service.

IS:5484 : Specifications for Aluminium wire rods.

IS:9335 : Specifications for insulating kraft paper.

IS:1576 : Specifications for solid insulating press Boards for electrical purposes.

IS:6162 : (Part I) : Specification for paper covered Aluminium round conductors

IS:6162 : (Part II) : Specification for paper covered Aluminium rectangular conductors

IS:104 : Ready mixed paint, brushing zinc chromate, painting

IS:649 : Testing of steel sheets and strips for magnetic circuits.

IS:2362 : Determination of water content in oil for porcelain bushing transformers.

IS: 4257: Dimensions for clamping arrangements for bushings.

IS:5561: Electrical Power Connector

IS:6262: Method of test for power factor and di-electric constant of electrical insulating liquids.

IS:6792: Determination of electrical strength of insulating oil.

IS 6160 : Rectangular conductor for electrical machines.

IS:10028 : Selection, Installation and maintenance of transformers

IS: 3401 : Silicagel

IS: 5/1961: Colour for ready mixed paints

REC Specification No. 2

REC Specification No. 39/1993

CEA Specification, Chapter 4

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. Four copies of such standards with authentic English Translations shall be furnished along with the offer.

### **3. 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.

i) Peak ambient temperature	: 50°C
ii) Minimum Ambient Temperature in shade	: -5°C
iii) Maximum average ambient temp. in a 24 hours period in shade	: 45°C
iv) Maximum yearly weighted average ambient temperature	: 35°C
v) Maximum temperature attainable by an object exposed to sun	: 60°C
vi) Maximum relative humidity	: 100 %
vii) Average number of thunder storm days per annum	: 40
viii) Average number of rainy days per annum	: 120
ix) Average annual rainfall	: 15-100 cm
x) Number of months of tropical monsoon conditions	: 4 Months
xi) Maximum wind pressure	: 195 Kg/mt <sup>2</sup>
xii) Altitudes	: Not exceeding 1000 mtrs.

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

### **4. PRINCIPAL PARAMETERS:**

The Transformers shall be suitable for outdoor installation with three phase 50 Hz 11 KV system in which the neutral is effectively earthed and should be suitable for outdoor service as step down transformers under fluctuations in supply voltage upto plus 10% to minus (-) 15% permissible under Indian Electricity Act and rules there under.

The transformer shall conform to the following specific parameters:

i) Continuous rated capacity	: 160 KVA
ii) System Voltage ( Max.)	: 12 KV
iii) Rated HT voltage	: 11 KV
iv) Rated LT voltage	: 433 V (P-P)/250 V (P-N)
Line current HV	: 16.53 A & 26.25 A
Line Current LV	: 420.02 A & 666.70 A
v) Frequency	: 50 Hz
vi) No. pf phases	: THREE
vii) Primary connection (HT)	: DELTA
viii) Secondary connection (LT)	: STAR
ix) Vector Group	: Dyn-11
x) Percentage impedance at 75°C	: 4.5 % / 5.0% respectively

- |                                 |   |                        |
|---------------------------------|---|------------------------|
| xi) Taps (off circuits)         | : | TAPS ARE NOT REQUIRED. |
| xii) Type of cooling            | : | ON AN                  |
| xiii) Fault level of the system | : | 750 MVA                |

Primary winding shall be DELTA connected and the secondary winding shall be STAR connected (vector symbol Dyn-11), so as to produce a positive displacement of 30° from the primary to the secondary vectors of the same phase. The neutral of the secondary winding shall be brought out to a separate insulated terminal. The transformers shall be **Aluminium Wound**.

The transformers shall be designed and constructed to withstand without damage the thermal and dynamic stresses of an external short circuit. The manufacturer / supplier shall furnish all relevant design data and calculations in support of having fulfilled this requirement as stipulated in IS:2026 (Part-I)

#### **5. NO LOAD VOLATGE RATIO:**

The No load voltage ratio(s) shall be 11000/ 433 Volts.

#### **6. THE LOSSES:**

The total Losses at 50% and 100% loading (at rated voltage and frequency and at 75 deg. C.) shall not exceed the value given below:

RATING (KVA)	MAX. LOSSES AT 50% LOADING (WATTS)	MAX. LOSSES AT 100% LOADING (WATTS)
160	770	2200

**NOTE: The supply of transformer shall only be availed after getting BEE Star Label Certification from Bureau of Energy Efficiency.**

The above specified loss values are maximum guaranteed, without any positive tolerance. In case the actual loss values exceed the above guaranteed values, the transformers shall be rejected at the risk, cost and responsibility of the supplier.

#### **7. TEMPERATURE RISE:**

Each transformer shall be capable of operating continuously at its normal rating without exceeding following temperature rise with the above service conditions given in clause-3.

- i) 35 Deg. C in oil by thermometer.
- ii) 40 Deg. C in winding by resistance

Temperature rise test shall be conducted on guaranteed losses.

**The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise. Bids not meeting the above limits of temperature rise will be treated as non responsive.**

It must be noted carefully that readings for hot resistance after shut down shall be taken separately for HV & LV windings, which means, after completing the readings for one winding (HV or LV), the transformer shall be connected again and rated current passed for another 60 minutes (min.) and shut down taken again to take hot resistance readings for the remaining winding. This is in line with the requirement of CBIP manual, to ensure proper resistance v/s time curves.

Hot Spot temperature not to exceed 98 Deg. C when calculated over an annual weighted average ambient temperature of 35 Deg. C as per IS:2026 (Part-II Clause 4.9.4). However, the transformer shall be designed for class 'A' insulation.

#### **8. UNBALANCE CURRENT:**

The maximum value of unbalance current in transformers shall not exceed 2% of full load current.

#### **9. IMPEDANCE:**

The percentage impedance at rated current at 75°C shall be 4.5% with (+/-) 10% tolerance.

#### **10. TAPPINGS:**

No taps are to be provided in these transformers.

#### **11. FREQUENCY:**

Transformers shall be designed for normal frequency of 50 Hz, but shall be capable of giving the rated output with the variation of plus/minus (+/-) 5% from the rated frequency.

#### **12. ELECTRICAL CLEARANCES:**

##### **(A) EXTERNAL (IN AIR)**

Minimum external electrical clearances after mounting the bimetallic terminal connectors in position shall be maintained, as under, however positive tolerance shall be acceptable without any ceiling.

Voltage	Medium	Clearance	
		Phase to phase	Phase to earth
11000 Volt	A I R	255 mm	140 mm
433 Volt	A I R	75 mm	40 mm

**B) INTERNAL (IN OIL):**

The following minimum internal clearances shall be maintained as per details given hereunder:

<b>PARTICULARS</b>	<b>160 KVA</b>
a) On width side (non bushing side)	25 mm
b) On length side (bushing side HV & LV both)	40 mm
c) Between HV windings & yokes (end insulation)	20 mm
d) Between LV windings to core (Bare conductor)	5 mm
e) From top of yoke to inside of top cover of tank (with gasket)	75 mm
f) Between LV/HV winding (Radial bare conductor Clearance)	11 mm
g) Phase to Phase Clearance between HV limbs	10 mm

The aforesaid external and internal clearances are minimum clearances and no negative tolerance on these clearances shall be allowed.

**13. TEST VOLTAGE:**

Transformers shall be capable of withstanding the power frequency and impulse test voltage prescribed below:

Nominal system Voltage (RMS)	Highest system voltage (RMS)	Impulse withstand voltage	Power frequency test voltage in (RMS)
11 KV 0.433 KV	12 KV ----	95 KV (PEAK) ----	28KV 3 KV

The Transformer shall have fully insulated windings designed for the above impulse level.

**14. HEAT DISSIPATION (COOLING) / RADIATOR CALCULATIONS & E T R (ELLIPTICAL TUBE RADIATORS) PLACEMENT:**

The transformers shall be capable of giving a continuous output without exceeding the specified temperature rise. Only Elliptical tube radiators of section 57 of gauge 18 (with tolerance as per relevant ISS) shall be acceptable on the transformers.

The header pipe connecting radiator bank to the tank shall be rectangular in shape with approximate size of 100x20 mm. The placement of top header pipe to the tank body shall be above the top of yoke, to facilitate cooling for hot oil sump over top yoke.

Cooling area of the tank/radiators should be sufficient to dissipate the guaranteed losses satisfactorily (as per Clause No. 7). Necessary calculations in this regard shall be furnished by the Bidder with their tender. For the purpose of heat dissipation calculations, the following criteria shall be adopted:

- i) Plain surface of tank – **500 W / m<sup>2</sup>**

(Note: The area of top/bottom tank surface, headers, HV/LV bushing pocket and conservator shall not be considered for purpose of above calculations).

- ii) Elliptical tube of section 57 -- 55 **watts**/meter length.

## **15. WINDING AND INSULATION:**

### i) MATERIALS:

Double paper covered Aluminium Conductors shall be used for 11 KV class transformers of each rating. **The covering shall be conformed to applicable ISS.**

### ii) CONSTRUCTION:

The High-tension windings shall be concentric with the Low-tension windings. The Arrangement of the windings shall be robust in electrical and mechanical construction and shall permit free circulation of oil and avoid hot spots. The LT conductor shall be rectangular in shape. Two layer of electrical grade insulation craft paper of 2 mil thickness or one layer of min. 4 mil thickness shall be used for interlayer insulation both for HV and LV Coils. Insulation cylinder made from electric grade pre-compressed board(s) having minimum total thickness of 1.5 mm shall be used between HV and LV windings. Alternatively 20 mil pressphan paper making thickness of the cylinder 1.5 mm having similar electrical properties may also be used.

For phase barrier, 2 Nos. of 1 mm thick press board shall be used for covering the tie rods. Besides, tie rods shall be covered by SRBP tubes of suitable size.

2 mm press board shall be used for base support insulation and core clamping channel insulation.

For bottom and top yoke insulation, only PC Board of min. 2 mm thickness will be used.

Also, vertical spacers between HV and LV coils and radial spacers (tickleys)/ blocks etc. shall be of PC Board only.

Top layer of all HV coil shall be given one coat of air drying insulation varnish.

A tolerance of upto plus minus 1% shall be permissible on ID and OD and axial length of HV and LV coils. However, the above tolerances are subject to maintaining the min. required clearances. The material and thickness of various insulation provided for phase barrier, foot plate insulation, yoke insulation and core clamp insulation shall be clearly indicated in the drawing and in any case shall not be inferior to those used in type tested transformers.

Min. number of coils on HV side shall be 6 (six) per phase for each rating transformers. Dovetailed shaped radial spacers shall be placed between HV coil sections, suitably – locked with vertical spacers around the circumference of the coils. The number of such spacers shall be minimum 8(eight).

### **Current Density**

The current density for HV and LV conductor shall not exceed the value given hereunder:

Rating	Current density in Amp/mm .sq.	
	HV winding	LV winding
160 KVA	1.6	1.6

### iii) **INSULATION MATERIAL:**

Electrical grade insulating Kraft paper of only Triveni / Ballarpur / Padamjee shall be used. Press Board used shall be of senapathy whitely / Raman make. Perma wood or haldu wood blocks shall be used for Top and Bottom yoke insulation.

### iv) **CONNECTIONS AND TERMINATIONS:**

- A) HV Winding:** The following method shall be adopted for taking out HV connections-
- The coil series connections shall be made by soldering / brazing only, after completely removing the insulation from the ends.
  - Starting and finishing leads of HT coils shall be covered with empire sleeve(s) of proper size. These leads should be clamped with the body of the winding with the help of cotton twine during manufacture of the coils.
  - All delta leads from the HT coils as well as HT line leads shall be taken out through **multiple paper covered** (MPC) copper wires of sufficient cross section area to impart the desired mechanical strength. The current density in HV lead wire shall not exceed **0.8 A/mm<sup>2</sup>**. These lead wires shall be provided with multi layer paper insulation of minimum 1.0 mm thickness i.e. minimum increase in diameter due to paper insulation shall not be less than 2 mm. The layer of glass sleeves/ glass tape shall also be provided on the delta MPC wire and it should be further covered with minimum 12 mm dia SRBP tube. The MPC should also be varnish dipped. The SRBP tube shall be extended in such a way that it is entered upto 50% of bushing height.
  - All the above leads shall then be clamped tightly with cotton twine directly on to the special frame/bracket making **"Pie"** shape connection. This structure could be made up of Bakelite/ Permalli wood/ laminated PC board flats, having minimum size of 25x6.0 mm. Line leads leading to the HV bushing terminals shall be directly clamped to the horizontal support bar of the **"Pie"** structure so that any tension which may develop in the HT leads due to jerks or at the time of making the connection , is not passed to the HT coils.
  - Delta joint and lead from delta joint to bushing rod shall be made by brazing only.
- B) LV Winding :**
- The LV connection shall be taken out by cut on the top yoke channel duly reinforced to compensate for the mechanical strength.
  - The layers in LV Coil may be either even or odd in numbers but minimum layers shall be two.
  - LV star point shall be formed of copper flat of sufficient strength. Leads from winding shall be connected to the flat by brazing.

- d) Firm connection of LV winding to bushing shall be made of adequate size of " L shape flat". Connection of LV coils to L shape flat shall be by brazing only.
- e) "L" shape Flat shall be clamped to LV Bushing metal part(s) by using nut, lock nut and washer.
- f) Neutral of the Secondary winding (LV) shall be brought out to a separate insulated bushing.
- g) For Aluminium windings, L&T, ALKAPEE aluminium brazing rods with suitable flux will be used.

## **16. CORE CONSTRUCTION & CORE COIL ASSEMBLY DETAILS:**

### **A . CRGO CORE**

(i) The core shall be **stack/ wound type** 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 to the frames firmly to prevent vibration or noise. All core clamping bolts shall be effectively insulated. The complete design of core must ensure the permanency of the core losses with continuous working of the transformers. The value of the flux density allowed in the designs and grade of laminations used shall be clearly stated in the offer, along with the curves. The transformer core shall be constructed out of the prime class of materials. CRGO Lamination used shall be of prime grade and not second grade steel laminations.

(ii) It will be mandatory for all the transformer manufacturers to use only **PRIME grade CRGO Laminations of M-4 grade/ 0.27 mm (with tolerance as per relevant ISS) thickness or better** with specific loss of 0.89 watt per kg. at 1.6 Tesla or any other combination of better grades with any thickness subject to maximum specific loss of 0.89 watt per kg. at 1.6 Tesla will also be acceptable. The bidder shall furnish the core loss (watt/Kg.) and power (VA/Kg) curves of the laminations used. The core shall be properly stress relieved by annealing in inert atmosphere. The transformer shall be suitable for over fluxing (due to combined effect of voltage and frequency) upto 12.5% without injurious heating. The operating flux density shall be such that there is a clear safe margin over the fluxing limit of 12.5%.

(iii) Full mitred core construction technique shall be adopted. Top yoke & bottom yoke pieces shall all be in one single piece and no cut pieces shall be acceptable. The cross sectional area of yoke & limb shall be approximately same.

(iv) The transformer core shall not get saturated for any value of V/f ratio to the extent of 115% of the rated value of V/f ratio (i.e. 11000/ 50) due to combined effect of voltage and frequency without injurious heating at full load conditions. The bidder shall furnish necessary design data in support of this situation.

(v) Flux density at rated voltage and frequency of core and yoke shall not be more than **1.6 Tesla**. The Over fluxing shall be limited to 12.5% of rated value.

The No Load Current (magnetising current) of each rating of transformers at rated voltage and at 112.5% of rated voltage shall not exceed the values given below:

Maximum permissible magnetising current in percentage of rated full load current	
At 100% rated voltage	At 112.5% rated voltage
3%	6%

**(vi)** For free circulation of oil axial and radial ducts of the following minimum thickness shall be provided:

Width of axial duct in mm in between insulating cylinder and		Radial duct between HV coils in mm
HV winding	LV winding	
5	4	8

Tolerance of  $\pm 1$  mm on above axial ducts width shall be allowed provided that total clearance between HV to LV coil (bare conductor) is maintained as minimum 11 mm.

### **(B). AMORPHOUS METAL CORE**

a) The core shall be high quality amorphous ribbons having very low loss formed into wound cores of rectangular shape, bolted together to the frames firmly to prevent vibration or noise. The complete design of core must ensure permanency of the core loss with continuous working of the transformers. The value of the flux density allowed in the design shall be clearly stated in the offer. Curve showing the properties of the metal shall be attached with the offer.

b) Core Clamping – Amorphous Metal and CRGO wound core Transformers

1. Core clamping shall be with top and bottom U-shaped core clamps made of sheet steel clamped with MS tie rods for efficient clamping.
2. MS core clamps shall be painted with varnish or hot oil resistant paint
3. Suitable provision shall be made in the bottom core clamp / bottom plate of the transformer to Arrest movement of the active part.

c) The transformer core shall be suitable for over fluxing due to combined effect of voltage and frequency upto 12.5% without injurious heating at full load conditions and shall not get saturated. The Bidder shall furnish necessary design data in support of this situation.

d) Flux density should not be more than 1.6 Tesla for Amorphous core. 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 disproportionately high and shall not exceed i.e., 6%. Test for magnetic balance by connecting the LV phase by phase to rated phase voltage and measurement of an, bn, cn voltage will be carried out.

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

### **(C) CORE-COIL ASSEMBLY:**

The core joints shall be interleaved and with full mitre design, as mentioned above. Ample provision for free circulation of oil in the radial gap between the core & LV coils shall be made. Eyes or lugs of sufficient size shall be provided for lifting core and winding

assembly out of the tank. The core shall be effectively earthed through **tinned copper earthing plate** bolted on core frame channels, after removing the channel paint.

For top yoke channels, if cut or holes are made for taking LV connections, suitable reinforcement to channels shall be made by providing adequate size of MS Flat of the thickness not less than 6 mm.

On the core-coil assembly, core clamping channels, tie rods, core studs, spacers, assembly base supports, etc. of each rating shall be provided as per details given hereunder:

Sr. No.	Item	Particulars
a)	Tie rods	Minimum 8 Nos. of 16 mm each properly insulated and covered with SRBP tubes. Tie rods shall also be provided with lock nuts.
b)	Core studs	Minimum 8 Nos. of 16 mm each properly insulated and covered with SRBP tubes. The core studs shall also be provided with lock nuts.
c)	Spacers	Minimum 8 Nos. dovetail type with min. peripheral coverage of 30%.
d)	Support of core assembly base	2 Nos. MS channels OF 100x50x6t mm. with minimum peripheral coverage of 40%.
e)	Channels for clamping core coil assembly	4 MS Channels of 100x50x6t mm. size (applicable for CRGO/ Amorphous Transformers)

Guides on all the four sides shall be provided to prevent shifting of the active parts and thereby accidental touching the tank. Alternatively boss nut arrangement at the top of core coil assembly to lock the same with the transformer tank be provided.

The assembly fixing boss nut(s) are to be welded, 20-30 mm off the centre line (and diagonally) of the tanks, so that assembly shifting during transport etc. is prevented. M S Channel, Tie Rods etc should be painted with hot oil and corrosion resistant paint before use.

All core-coil assembly shall be indelibly marked / punched on core channel / a identity plate welded on core channel with following details:

1. Name of Supplier:
2. Order / TN No:
3. Rating:
4. Sr. No. of Transformer:

**In case if above marking is not found on the core assembly of physically opened transformer selected for physical verification during final inspection then no further inspection shall be carried out and re-inspection charges shall be payable by the supplier.**

**17. TRANSFORMER TANK:**

(a) Transformers tank shall be rectangular in shape, robust in construction and with adequate strength to withstand the pressures developed at the time of severe fault conditions. The tank body shall be suitably stiffened to achieve the object. The tank sheet shall be electrically welded both from inside and outside to impart proper mechanical strength and to plug leakage of oil. 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 plates shall be of such strength that the complete transformer when filled with oil may be lifted bodily by means of lifting lugs provided. The stiffeners shall be welded full length. All the welding shall be continuous. The top cover plate shall be sloping down by more than 15 mm, opposite LV bushings side. The top cover shall be extended by 5 mm by all the sides beyond the flange of the top cover. Accordingly length of the lifting hooks shall be extended. The top cover shall have no cut at point of lifting lug. **No negative tolerance in the tank dimensions is acceptable in actual supply.** The tank shall be fabricated by welding at corners. No horizontal or vertical joints in tank side walls and its bottom and top cover will be allowed.

(b) Minimum size of MS Sections to be used in construction of each rating of transformer tanks shall be as under:

<b>Sr. No.</b>	<b>I T E M S</b>	<b>Parameters</b>
1	Tank Cover plate thickness (mm)	5.0 t
2	Tank Sides wall thickness (mm)	4.0 t
3	Tank bottom plate thickness (mm)	5.0 t
4	Conservator body (mm)	3.0 t
5	Detachable Conservator side Cover	N.A.
6	No. of stiffeners (To be welded on four side of the tank in the angle forms inverted "L")	2 No.
7	Size of M. S. stiffener (mm)	40x40x 6 angle
8	Tank Top flange size (mm)	50 x 6 t Flat
9	Cover Bolt Size	M12x40L/ 4/8 x 1.5"
10	Cover Bolt spacings (Maximum)	75 mm
11	Lifting lugs	2 Nos. 10t mm flat
12	Tank Base Channel (ISMC Type) at a C-C distance of 415 mm)	2(100x50x6t mm)

\* **Tank base channels shall be provided parallel to the bushing lines.**

NOTE: Each cover bolt shall be complete with two flat washers, one nut and one spring washer.

- i) The 12 Nos. nuts & bolts ( 4Nos each on length sides & 2 nos each on widths sides of tank body) to be tag welded on top cover / tank body of the transformer.
- ii) The 04 Nos. Anti Theft Fasteners shall be provided - one each on all four sides in centre of body of transformer. Two holes shall be provided – one on top cover and other on collar of transformer to facilitate providing of 2 Nos. poly-carbonate seals on longitudinal side.

**Additional 8 Nos. stainless steel anti theft fasteners (nuts and bolts) used for fixing the base channel on structure shall be provided by the supplier.**

The above mentioned M S sections shall be subject to tolerance as per ISS.

**MEASUREMENT OF SHEET THICKNESS OF TRANSFORMER TANK:**

**The following measurements shall be carried out at respective Central Testing Lab (CTL) of the Discom(s) on the supplies of distribution transformers:**

**Measurement of Transformer Tank Thickness shall be done as follows:-**

<b>1.</b>	<b>Top Cover</b>	<b>At 2 places to be measured &amp; average is to be taken.</b>
<b>2.</b>	<b>Bottom Cover</b>	<b>-do-</b>
<b>3.</b>	<b>Side Wall(s)</b>	<b>On all four sides (average is to be taken)</b>

For transformer tank sheet thickness verification, the average of top and bottom cover be taken collectively and not individually to decide acceptance/ rejection of transformers.

▪ **The nominal value of sheet thickness will be considered as mentioned in the Specification.**

▪▪ **Rolling tolerance will be as per ISS:1852-1985 with latest amendment and no penalty will be charged on such measured thickness till tolerance limit of ISS.**

▪▪▪ **Sheet thickness of transformer tank for Distribution Transformers as per relevant tender specification are as under for ready reference:**

<b>Sr. No.</b>	<b>Rating</b>	<b>Top Cover (mm)</b>	<b>Bottom Cover (mm)</b>	<b>Side of Tank (mm)</b>
<b>1</b>	<b>315 KVA Three Phase</b>	<b>5.0</b>	<b>5.0</b>	<b>4.0</b>

**Further it is also intimated that 5% variation beyond tolerance limit in measurement of sheet thickness on negative side shall be acceptable by the Discom with levy of penalty. The rate of penalty will be Rs.80.00 per Kg.**

**For example:**

<b>Weight of 160 KVA Transformer Tank</b>	<b>1000 Kg. (approx.)</b>
<b>Variation in thickness of tank</b>	<b>5% (beyond tolerance limit)</b>
<b>Then penalty levied will be</b>	<b>1000x80x5 = Rs.4000.00</b>
	<b>-----</b>
	<b>100</b>

**In case any dimension in transformer tank sheet thickness found beyond aforesaid limit of (-) 5% will not be acceptable to the Discom and the relevant sub-lot shall stand rejected and the lot of such transformers will have to be replaced by the firm.**

**The highest percentage variation on negative side in respect of measurement of sheet thickness of any part of tank will be applicable on the entire dimensions for levy of penalty.**

**The sheet thickness measurements will be carried out on all those sample transformers which are tested in CTL and test results will be applicable to the respective sub-lot or part thereof from which the sample is drawn.**

(c ) Lifting Lugs: Two Nos. welded heavy duty lifting lugs of MS plate of 10mm thickness, suitably reinforced by vertical supporting flat welded edge wise below the lug on side wall shall be provided, these shall be so extended that cutting of bent plate is not required

(d) Top cover gasket & Bolt:

- iii) The gasket provided in between top cover plate and tank shall be of min. 6 mm thick neoprene rubberized oil resistant cork sheets conforming to type B or C as per IS 4253 part II
- iv) G.I. Nut bolts shall be of size M 12 x 40 mm / 4/8x1.5" long with two flat washers, suitably spaced (as specified) to press the cover.
- v) Height of the tank shall be such that minimum clear height is to be achieved between top of yoke and under side of the tank cover (with gasket in place) as under:
  - a) 160 KVA rating - 75 mm
- vi) All steel screws, nuts and fasteners exposed to atmosphere shall be either galvanised or cadmium plated or electroplated.
- vii) All sealing washers / gaskets shall be made of oil and heat resistant neoprene or nitrile rubber. Gaskets made of natural rubber sheet are not permissible. The minimum thickness of gaskets shall not be less than 6 mm for tank cover and 4mm for HT/LT gasket washers.
- viii) Talbros make neoprene/nitrile based rubberized cork sheet – grade RC-70-C shall only be used as gasket material. Alternatively, other makes of gaskets having type designations as under can also be used, if 'Talbros' make gasket is not available:

S. No.	Name of the firm	Commercial name of gasket manufactured by the firm.
1.	M/s. Nu-Cork Products P. Ltd. Gurgaon	Nu-Cork (Neoprene) Nu-Cork 999 RC-70-C
2.	M/s. Bharat Corrub Ind. Vadodara	Chetak (Neoprene) RC-70-C
3.	M/s. Grindbeck. Gujarat	Zebra (Neoprene) RC-70-C
4.	M/s Goodwill Rubber Ind. (P) Ltd., Calcutta.	Mayur (Neoprene) RC-70C

(e) Tank shall be reinforced by continuously welded angle on all the four sides of the walls, on the edge of tank, as specified above. The permanent deflection shall not be more than 5 mm upto 750 mm length and 6.5 mm upto 1250 mm length when transformer tank without oil is subjected to the vacuum of 250 mm of Mercury.

**f). PAINTING & FINISHING:**

Steel surface shall be prepared by sand / shot blast or chemical cleaning including phosphating, as per IS 3618. Heat resistance paint (Hot oil proof) shall be provided inside tank. On external surface, one coat of thermo-setting powder paint or 2 coat of Zinc chromate followed by two coat of synthetic enamel paint of olive green colour, confirming to shade No. 220 of IS: 5-1961, shall be applied in order to distinguish of star level transformers.

The requirement for paint and the material to be used as below.

Paint Type	Area to be Painted	No. of coats
a) powder Paint	Inside	01
b) Thermo Setting Powder	Outside	01
<b>LIQUID PAINT</b>		
a) Zinc Chromate (Primer)	Outside	02
b) synthetic Enamel (finish coat)	Outside	02
c) Hot Oil Paint	Inside	01

All steel screws, nuts and fasteners exposed to atmosphere shall be either galvanized or cadmium plated.

**g) The TN No., Sr. No. of the transformer and name of the manufacturer should be punched/ embossed on top cover/ bottom cover/ sides of tank body (size of letter 10x5 mm).**

**18. FITTINGS & ACCESSORIES:**

"The following standard fittings shall be provided on each transformer:

- a) Earthing terminals of M12x40L/ 4/8x1.5" with tinned lugs and symbol – (2 Nos.)
- b) Lifting lugs – (2 Nos. for main tank).
- c) Rating and terminal marking plate (non-detachable), details to be included in one plate only. The plate shall be of **stainless steel** only, with details clearly marked - (1 No.)
- d) Bi-metallic terminal connectors on HV bushings and L-type connectors on LV bushing shall be fitted before dispatch.
- e) Oil level gauge of minimum 150 mm length of prismatic glass, indicating three positions of oil, marked as follows, shall be provided:

1)	-5 °C - Min.
2)	30 °C - Nor.
3)	98 °C – Max.

- f) Silica Gel Breather shall be aluminium/ metal – (1 No.)
- g) Thermometer pocket, 12.5 mm dia with cap. shall be provided — (1 No.)
- h) Oil filling hole (1/4"dia) with cover and gun metal drain valve of 20 mm size on the oil conservator.
- i) a) One filter valve of gun metal of 20 mm size at the top side of the tank.  
 b) One drain cum sampling cum filter valve of gun metal at the bottom side of the tank but opposite of the top filter valve. The necessary arrangement for locking on this valve by providing MS Sheet box duly welded on tank body shall be made.  
 c) The valve shall be either of Leder or L&T or AUDCO make and wheel type.
- j) **HV Bushings.** These shall be of 17.5 KV/250 A class, porcelain/ polycrate with non adjustable, single gap type arcing horns – (3 Nos.)
- k) **LV Bushings.** 1.1 KV class: (4 Nos.)  
 a) 630 A (M 20 stem) – for 160 KVA rating.
- l) Brass rod 12 mm diameter for HT Terminals of each rating – (3 Nos.)
- m) Brass rod for LT Terminals of each rating – (4 Nos.)  
 a) 20 mm diameter for 160 KVA rating transformer
- n) 100 mm dial type thermometer for oil temperature indication.
- o) Two pulling eyes one each on opposite side of the tank.
- p) Explosion vent (pressure relief valve ) and pipe connected with conservator.
- q) Air release device.

**Note:**

1. **As mentioned above, suitable bi-metallic connectors on HV bushing and L-type connector shall be provided, having capacity of about 1.5 times the rated current of the transformer.**
2. LV/ HV Connector shall not be the integral part of the bushing stems".

**19. CONSERVATOR:**

When a conservator is fitted, the oil gauge and the breathing device shall be fixed to the conservator. In addition, the cover of the main tank shall be provided with a self-sealing pressure release device designed to operate at minimum pressure of 8 PSI (0.564 Kg./cm. Sq.) to enable release of air trapped within the main tank, unless the conservator is so

located as to eliminate the possibility of air being trapped within the main tank. The conservator shall be of cylindrical shape and it should be provided above the HV bushing with a minimum clearance of 50 mm and suitably inclined to maintain the clearance.

The total inner volume of conservator shall be minimum of 10% of the volume of oil in each rating of transformer. The inside diameter of the pipe connecting the conservator to a main tank shall be min. of 50 mm and it should be projected into conservator in such a way that its end is approximately 25 mm above the bottom of conservator so as to create a sump for collection of impurities. The min. oil level (corresponding to – 5 deg. C.) should be above the sump level. The connecting pipe from conservator tank to main tank shall have a sloping flap so that oil falling from pipe shall not fall directly on the active job.

**The oil filling hole cap of conservator should be welded with tank body with the help of suitable inverted 'U' shape clamp.**

## **20. SILICAGEL BREATHER:**

Body of breather shall be of aluminium/ metal and inside container for Silica gel shall be of tin sheet. The breather shall be only from reputed and approved manufacturer and as per the approved drawing. The gel capacity shall be of 500 grams. Inverted U shape pipe shall be used for breather. Mounting arrangement of the breather shall be flanged/ threaded type as per details given in the illustrative drawing attached.

The design shall be such that the condition of Silica gel is clearly visible from a distance, even after years of service.

## **21. H V BUSHING TERMINAL DETAILS :**

The transformer shall be provided with outdoor type 3 Nos. 17.50 **KV / 250 A** class porcelain bushings, conforming to IS:3347/1972 & IS:2099/1973 from the manufacturer of repute. The HV bushings shall be on top of the tank and shall be fitted on a pocket made on top cover. These pockets shall be such that the HV bushing is tilted more towards the HV side. The bushing of R & B may also be tilted sidewise to maintain the required electrical clearance. The bushings rods and nuts shall be made of brass. The inner porcelain portion of the bushing shall be projected about 50% of the length inside the bushing pocket. **HT bushing(s) mounting bolts should be tag welded.**

The clamping ring of HV bushing shall be of galvanised MS Sheet having minimum thickness of 1.6 mm. The total weight of all the 12 aluminium caste member of HV bushing shall not be less than 210 grams.

The arcing horn(s) shall be single gap and fixed type. HV bushings shall be of reputed make such as BEPCO, JAYSHREE, WSI, SESHASAYEE, JAIPUR GLASS, BPPL Bikaner, Agarwal salt Co. Bikaner, Baid Sanitary Works, Bikaner/ **Krishna Ceramics, Nasirabad** or any other make - approved by the purchaser. The HV bushings shall generally conform to IS: 3347 and IS: 2099. Embossing showing the manufacturer's name and month & year of manufacture shall be clearly visible on HV bushings, even after fixing on transformer(s).

## **22. L V BUSHING TERMINAL DETAILS:**

“LV Bushing side shall be on side of the tank but opposite to the HV Bushing side. 4 Nos. LV Bushings (1.1 KV/630 A for 160 KVA rating transformers) shall be mounted on the tank wall. Projection of the LV pocket shall be such that inner portion of the LV stem shall not project more than 20 mm inside the tank, to facilitate unhindered lifting of the core coil assembly. Bushing stem of M 20 size shall be of brass. Rest of the components shall conform to the requirement of IS:3347 (Part I/section 2). The LV bushings shall be of reputed make such as JSI, JAIPUR GLASS, BPPL Bikaner, Baid Sanitary Works, Bikaner, Agarwal salt Co. Bikaner, or any other make approved by the purchaser. The LV bushings shall generally conform to IS: 3347 and IS: 7421”.

## **23. TRANSFORMER OIL:**

The transformer shall be supplied complete with first filling of EHV Grade transformer oil, up to the normal oil level. The oil shall conform to IS: 335-1993 (latest amended) and should be ISI Marked and having the specified aging characteristics.

The make of Transformer Oil shall be either APAR/SAVITA/ RAJ LUBRICANTS/ ANAMIKA/SHARAVATI/ MADRAS PETRO/ RAJ PETROL/ LUBRICHEM, MUMBAI/ OPANAMA PETROCHEM, ANKELSHWAR/ TASHKENT OIL, VADODARA/ **COLUMBIA**. The transformer oil sample taken from the transformer shall be subject to testing as per provisions of IS:1866.

The oil manufacturer’s test certificate shall be made available at the time of inspection to the inspecting officer.

## **24. IDENTIFICATION DETAILS:**

A) **Rating & terminal marking plate:** Each Transformer shall be provided with non detachable name, rating and terminal marking plate fitted in a visible position. All details shall be given on one plate. Material of the plate shall be stainless steel only. Thickness shall be 0.9 mm (with a tolerance of  $\pm 0.1$  mm). The plate shall be made absolutely undetectable either through welding or riveting or through any other approved method.

Each HV & LV terminal shall be duly marked with its terminal numbers. (e.g. HV terminal with capital letter 1U, 1V, 1W and LV terminal by corresponding small letters) 2u, 2v, 2w and the neutral terminal by 2n). In the diagram to be given on the name plate, the relative position of various terminals- when viewed from top – shall be clearly shown. Inspection shall not be undertaken unless all these details are verified by the Inspecting Officer.

Besides other particulars, following details shall also be given on the name plate:

- i) P.O. No. - month & year.
- ii) Sr. No. of transformer.
- iii) Date of despatch - month & year
- iii) Date of expiry of guarantee period – month & year
- iv) Maximum Guaranteed No Load & Load Loss Figures
- v) Recommended fuse sizes for HV & LV sides.
- vi) Name & Full address of the manufacturer.

- vii) Capacity of the transformer.
- viii) Rating of the transformer.

ALL DETAILS ON THE NAME RATING AND DIAGRAM PLATE SHALL BE INDELIBLY MARKED i.e. BY ENGRAVING, STAMPING or PUNCHING.

I) **Identity Plate :-** A M.S. plate of size 75 x 75 x 2.5 mm shall be continuously welded to the main tank body below the middle HV bushing and in clearly visible position, with following details clearly punched :

JAIPUR DISCOM TN –  
 ..... KVA , S.NO. ....  
 .....MAKE .....

II) **Identification Mark :-** In addition to above, the following identifying details shall be clearly punched on top cover near lifting lug, towards neutral side, with minimum 10 mm x 10 mm size punch letters.

MAKE \_\_\_\_\_  
 Sr. No. \_\_\_\_\_  
 TN \_\_\_\_\_

The above identification mark shall also be punched / welded to one of the top core clamping channels.

Further following details is to be punched on all the four sides of the tank preferably in center. The dimensions of letters should be 10x10 mm. The punching shall be clearly distinct and visible.

- a) Make
- b) TN No.
- c) Sr.No.

B) To punch the details make, TN No. & Sr.No.of transformer at two places ( i.e. at the top cover & transformer tank). The punching shall be distinct and visible.

C) **Technical Plate-** In addition to existing provision of identity plate and name plate one plate also be affixed on the transformer mentioning the following details:-

- A) Name of the Firm
- B) TN No.
- C) Make
- D) Rating
- E) Core :-
  - 1. Core Dia
  - 2. Core Area
- F) LV Coil :-
  - 1. ID/OD Dimensions
  - 2. Conductor Size
- G) HV Coil :-
  - 1. ID/OD Dimensions
  - 2. Conductor Size
- H) Limb Centre
- I) Window Hight

**25. GUARANTEED AND OTHER TECHNICAL PARTICULARS FOR TRANSFORMERS:**

Guaranteed Technical particulars of the transformers offered shall be furnished in A-4 size paper by the Tenderer in the proforma appended herewith at **Annexure-A**. Complete details shall be furnished. Tolerances on weight quantity and dimension figures shall be  $\pm 5\%$  at the tender stage, subject to maintaining the minimum electrical clearances as per the specification. However, no negative tolerance shall be allowed on the short circuit type tested design. Electrical performance data shall be subject to tolerances as per ISS, unless otherwise specified in this specification. However, the Total losses at 50% & 100 % loading shall be maximum guaranteed without any positive tolerance.

**26. TYPE TEST CERTIFICATES:**

The bidder shall furnish type test certificates of offered design / similar design, wherever available, with the bid.

**27. DRAWINGS AND OTHER DOCUMENTS:**

The tenders shall be accompanied with the following drawings / Calculation sheets, as per the offered designs. The drawings shall be only on A-3 (420 x 297 mm) size paper and calculation sheet shall be on A-4 size paper only.

- a) Name rating / diagram plate drawing.
- b) Outline and general arrangement drawing.
- c) Core-coil assembly drawing.
- d) Core section (for limb and yoke) along with flux density calculation sheet / drawing.
- e) Cooling area calculation sheet.
- f) Thermal Ability short circuit calculation sheet.
- g) Core loss and magnetization curves of the laminations.
- h) Heat dissipation calculations (heat dissipation by tank walls excluding top and bottom should be 500 W/sq.meter).

**28. QUALITY ASSURANCE PLAN:**

The purchaser intends to purchase Transformers only from quality conscious manufacturers.

The tenderer shall furnish the details in respect of following, in the schedules prescribed herein this specification, failing which the offer is liable for rejection.

- a) List of testing equipment and instruments (with class of accuracy) available with tenderer for inspection, testing and checking the Transformers offered, as per tender specification in the schedule of testing facilities (Schedule-VIII). The calibration details should also be included.
- b) List of machines/equipment/T&P available with the tenderer for manufacturing the Transformers, in the schedule of plant and machinery (Schedule-IX).

- c) Details of type tests conducted on the Transformers offered to supply in the schedule of type test (Schedule-X).
- d) List of raw material components and sub-assembly to be used for manufacturing the equipment offered, in the schedule of raw materials and components (Schedule-XII).

The tenderer should possess adequate facilities for inspection and testing of the Transformers, as per requirement of the relevant ISS and this specification. In case any supplier is found not having all the instruments/equipment required for testing, the offer shall be ignored. No borrowing of instruments / equipment shall be allowed. Testing of the Transformers shall also not be allowed at the works of any other manufacturer. However, testing may be allowed at any Government Testing Laboratory.

## **29. INSPECTION AND TESTING:**

( i ) The inspection and testing shall be conducted as per relevant clause of the General Conditions of Contract (Section-II) at the place of manufacture. The transformers shall be completely assembled and tested at the factory. The inspection may be carried out by the purchaser at any stage of manufacturing. The supplier shall grant free access to the purchaser's representative at all reasonable times when the manufacturing work is in progress. Inspection and testing of any material under this specification by the purchaser shall not relieve the supplier of his obligation of supplying the material in accordance with the specification and shall not prevent subsequent rejection if the material is found to be defective.

( ii ) The supplier shall afford the inspector representing the purchaser all reasonable facilities, without charge, to satisfy him that the material is being manufactured in accordance with the specification. The bidders must have adequate set of instruments for conducting testing as per ISS/ Specification. The instruments for measurement of losses shall be of accuracy class of 0.5 or better. The instruments shall be duly calibrated and Calibration Certificate should not be older than one year on the date of presentation to the Inspecting Officer. The calibration shall be arranged from NABL accredited testing house. A comprehensive list of testing equipment/ instruments indicating make, Sr.No., type, class of accuracy, calibrating agency, calibration date etc. should be furnished alongwith the bid. The calibrated instruments shall be duly sealed by calibrating agency to avoid any tampering with calibration and the details thereof shall be clearly mentioned in the Calibration Certificate(s).

( iii ) The supplier shall keep the purchaser informed in advance, about the manufacturing programme so that arrangements can be made for inspection. The supplier shall give minimum fifteen days advance intimation to enable the purchaser to depute his authorised representative for witnessing of various tests on the equipment/ material as detailed below:

**NOTE:- Penal provision shall be made for any short technical parameters found / noticed in the transformers at any time even beyond guarantee period.**

**30 ROUTINE/ ACCEPTANCE TESTS:**

**A) 100% testing of the Distribution Transformers shall be carried out at firm's works for measurement of total load losses at 50% & 100 % loading. Remaining testing shall also continue to be carried out as per practice.**

All the assembled/ finished transformers prior to despatch shall be subjected to routine tests as per IS:2026. Minimum 25% of the offered lot size samples subject to minimum 5 Nos will be taken for routine and acceptance tests. The supplier shall invariably furnish manufacturer's routine test certificate along with inspection call of the offered transformers for pre-despatch inspection. **The inspection offers without furnishing of routine test certificates as per ISS of all the transformers offered for final inspection shall not be entertained, and any delay on this account shall be to firm's account.**

The selected samples shall be subjected to the following routine / acceptance tests at the manufacturer's works in accordance with the relevant ISS:

1. Insulation resistance
2. Separate source voltage withstand test
3. Induced over voltage withstand test
4. Measurement of windings resistance cold (at or near the test bed temperature)
5. Measurement of Voltage ratio and check of voltage vector relationship
6. Measurement of Impedance voltage.
7. Measurement of total losses at rated voltage and normal frequency (at 50% & 100% loading).
8. Measurement of No load current at 100 % and 112.5% of rated voltage and normal frequency.
9. Checking of rating and terminal marking plate.
10. Checking of weights , dimensions, fittings and accessories, tank sheet thickness, oil quantity , material, finish , paint thickness and workmanship as per purchase order and contract drawings.
11. Physical verification of core – coil dimension, internal clearances, provisions of required oil ducts in the HV and LV winding, conductor sizes, individual weights of HV and LV winding core laminations etc., with reference to contract drawings and type test report(s) by dismantling selected unit(s). The physical verification shall be conducted on units equivalent to one unit per 50 Nos or part thereof of offered quantity randomly selected from the offered lot. The dismantled unit(s) after re-assembly shall be accepted by the purchaser after routine testing in presence of his representative.

**During final inspection, sheet thickness shall also be measured of the transformer opened for physical verification. The instrument for measurement of sheet thickness will be provided by the supplier.**

12. Oil dielectric strength (break down voltage) test shall be carried out on the transformers opened for physical verification and average value shall be calculated.
13. Checking of manufacturer's test certificates and invoices for major raw materials shall be done and copies thereof duly signed by firm's representatives and inspecting officers shall be enclosed with the inspection report.

Invoices of CRGO material shall be provided by the supplier to the inspecting officer at the time of inspection and same shall be verified by the inspecting officer.

Following tests shall also be carried out at manufacturer's works on one complete unit of 160 KVA Transformers unit. These tests shall be got conducted/ witnessed by the inspecting officer of independent NABL accredited lab and the certificate shall be issued by the same lab

- i) Temperature rise test (in the first lot and may be repeated in subsequent lots if desired by purchaser).
- ii) Air pressure test on empty tank of transformer opened for physical verification test. (See note below)
- iii) Over Flux Density Test (in the first lot and may be repeated in subsequent lots if desired by purchaser).
- iv) Measurement of unbalance current.
- v) Magnetic Balance Test (See note below)
- vi) Oil Leakage Test (See note below)

Fifteen days clear notice shall be arranged for pre-despatch inspection by purchaser's representative as per General Conditions of Contract.

After successful inspection, the inspecting officer shall seal **each and every transformer by sealing the transformer with 2 Nos. poly-carbonate seals on longitudinal side as per the manner mentioned in Clause No. 17 above.** Before sealing, the inspecting officer will ensure that all the offered transformers are completed and duly fitted with name, rating and diagram plate, identification plate (on tank body & Top cover) as specified in this specification.

**NOTE: Also after inspection/ testing, inspecting officer(s) shall affix Signature Seals also on each Transformer in addition to other seals.**

**i) INSULATION RESISTANCE MEASUREMENT:**

Insulation resistance of selected samples shall be measured with a 2500 V Megger, of standard make such as M/s AVO, M/s Sakova, M/s Wako, M/s Evershed, Vignole or Metrawatt. The minimum insulation resistance, in Mega Ohms, shall be as indicated in the table below:

	20 Deg.C.	30 Deg.C.	40 Deg.C	50 Deg.C.	60 Deg.C.
11000 Volts (HV)	800	400	200	100	50
433 Volts (LV)	400	200	100	50	25

**(ii) AIR PRESSURE TEST:**

This test shall be conducted as type test at the time of inspection of first lot, at the manufacturer's works. The pressure gauge and vacuum gauge shall be duly calibrated and sealed by an independent recognised test lab(s).

The test procedure shall be as detailed below:

The tank shall be fixed with a dummy cover with all fittings including bushings in position and shall be subjected to air pressure of 0.8 Kg./ cm<sup>2</sup> (gauge pressure), for 30 minutes.

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

<b>Length of plate up to</b>	<b>Deflection</b>
750 mm	5.0 mm
751 to 1250 mm	6.5 mm

**iii) MAGNETIC BALANCE TEST:**

This test shall be conducted as an additional test on one sample transformer from each lot offered for inspection.

The application of low voltage to the middle limb will induce approximately equal voltages on the two end limbs. The application of voltage to the end limbs will induce greater voltage in the middle limb and less voltage in the other end limb. Uniformity of induced voltages shall confirm the healthiness of the transformer windings.

The procedure for the test shall be as under:

- a) Apply 250 Volts between LV terminals-2u-2n and measure voltages between 2v-2n & 2w -2n.
- b) Apply 250 Volts between 2v-2n and measure voltages between 2u-2n & 2w-2n.
- c) Apply 250 Volts between 2w-2n and measure voltages between 2u-2n & 2v-2n.

The measured voltages shall satisfy the conditions detailed as above.

**iv) OIL LEAKAGE TEST:**

The oil leakage test shall be conducted on one unit selected from the offered lot of each rating. Transformer complete in all respects shall be subjected to the pressure corresponding to 0.5 Kg / cm<sup>2</sup> and maintained for three hours. No leakage should occur.

**31. TYPE TESTS:**

In addition to above tests the following type tests shall be arranged **on one transformer only** in accordance with IS:2026 (Part I to III).

- i) **Short circuit test for dynamic and thermal ability:** The short circuit test for dynamic and thermal ability shall be arranged at CPRI, Bangalore/ Bhopal or ERDA, Vadodara on one unit of each rating. The transformer(s) for the test shall be selected/ sealed by our inspecting officer from the first lot which shall be of minimum 20 Nos. (if ordered quantity is 500 Nos.) OR 50 Nos. (if ordered quantity is more than 500 Nos.). The short - circuit test shall be conducted only after successful routine tests including measurement of no-load and load losses. The supply shall be accepted only after arranging successful type test on the selected transformer(s).
- ii) **Impulse voltage withstand test:** The impulse voltage withstand test shall be arranged at any testing house accredited to NABL for purpose of impulse test. The test shall be conducted on one unit of each rating to be selected by our inspecting officer from the first lot of 20 Nos. (if ordered quantity is 500 Nos.) OR 50 Nos. (if ordered quantity is more than 500 Nos.). The test procedure shall conform to the requirement of Clause 13 of IS: 2026 (Part-III). Impulse voltage withstand test shall be for 95 KVp instead of 75 KVp The supply shall be accepted only after arranging successful impulse test on the selected transformer(s).

**Note :-**If ordered qty. Is less than 500 Nos. In such case first lot shall be of min. One month qty as per scheduled delivery .

No extra time shall be allowed for arranging these type tests. The cost of above Type Tests shall be borne by the supplier.

The programmed indicating date and place of type test(s), be intimated enabling purchaser to depute his representative to witness the test if desired. The testing house shall be advised to arrange type test result directly alongwith drawings duly attested by the testing authority for our scrutiny and approval. The type-tested transformer(s) shall also be accepted as the part of the supplies.

The requirement of arranging short circuit & impulse voltage withstand test shall however, not to be insisted on the suppliers who have arranged Dynamic & Thermal Ability to withstand Short Circuit Test/ impulse voltage withstand test within last 3 years from the date of opening of this tender on similar design. Minor changes in the present specification will not necessitate repetition of type test(s), if design of core-coil assembly is similar in essential details.

**32. RANDOM SELECTION AND TESTING (RST):**

**32.1** The purchaser may select transformer(s) from the supplied lot(s) at random from the stores for conducting the following type tests, at any test house(s) as mentioned above. The supplier shall arrange these tests including loading, unloading and to & fro transportation from our stores to the test house(s). The charges for such tests shall be reimbursable to the supplier on actual basis on production of documentary evidence in case the selected sample successfully withstand type test(s). In case of otherwise, no charges will be reimbursed.

- i) Short circuit withstand test for Dynamic & Thermal ability. Measurement of No load Loss & Load Loss shall form part of tests conducted before and the after the short circuit test and recorded in the report.
- ii) Impulse test at 95 KVp instead of 75 KVp as per Clause No.13 (with chopped waive) of IS:2026 (Part-III).
- iii) Purchaser reserves the right to carry out any site tests he may decide upon at his own expenses. In case equipment/ material are not found as per P.O., all expenses incurred during the testing will be to supplier's account and material shall be replaced by the supplier at site free of cost.

**FAILURE IN TYPE TEST(S):**

In the event of failure / unsatisfactory results of the transformer(s) in Dynamic & Thermal Ability to withstand Short Circuit Test / impulse type tests, the supplier shall have to replace the supplies already made and no further transformers shall be accepted. The purchaser however, at his option, may accept the transformers already supplied with the following conditions:

- i) Guarantee period of the supplied transformers issued to the field shall be increased by double the normal Guarantee period.
- ii) Bank Guarantee shall be extended to cover the additional Guarantee period.
- iii) For failure in any of the type tests listed under RST i.e., short circuit test & Impulse withstand test, no further supplies shall be accepted. The type test charges shall also not be reimbursable in this case and shall be borne by the supplier.
- iv) The transformers lying in the store(s) shall be replaced as per sub para (v) below.
- v) The bidder shall, however, be allowed to check the reasons of failure and if need be, to improve / modify the design. Further supplies, including replacements against supplies already made, shall be accepted only after successful type test(s) are arranged on fresh transformer(s) selected by the authorized representative of the purchaser. All the type tests shall be arranged in case there is change in the design, otherwise, type test shall be repeated only for the test in which failure has occurred. Charges for such test(s) shall be borne by the supplier. However, in the event of failure of transformer in the repeat type test, the purchaser may take following actions:
  - a) Cancel pending orders of the rating in which failure(s) has occurred, &
  - b) Not place any order of Distribution Transformers on the firm for one/ two year(s)

### **32.2 Measurement of total losses (at 50% & 100% loading):**

(i) After pre-dispatch inspection of material at firm's works, the dispatch instructions will be issued for the respective store(s) as per requirement of Nigam. Sample(s) will be drawn from the lot(s) received in store(s) and will be subjected to the following test(s):

- a) One transformer will be selected out of every lot of 10 Nos. or part thereof for measurement of No load Losses at rated voltage; No Load current (at 100% and 112.5% of rated voltage); Impedance voltage, thickness of tank body sheet and total Losses at 50% and 100% loading at rated current. The testing shall be arranged either at purchaser's own testing lab and / or at independent test lab. The testing charges for such tests shall be borne by the purchaser. The test results will be applicable to the respective lot of 10 Nos. from which sample was drawn.
- b) In case if dispatch instructions are less than 10 Nos. than one sample shall be selected from each store (s) and the test result so obtained shall be for the quantity consigned / received by the store (s).

The percentage impedance voltage at rated current shall not exceed the permissible limit as specified with allowable tolerance failing which the sub lot of transformers represented by the sample shall be rejected. The transformers selected for total Losses shall also be subjected to magnetizing current and in case found beyond the limit, the lot shall stand rejected.

The I.R. values of the sample(s) shall be measured at CTL, Jaipur and it must be more than 50 MEGA-OHM.

**One sample out of 100 Nos. transformers or part thereof (whose Sr. No. shall be decided by the committee members) shall be selected for physical verification/ checking of window height, limb centre and checking of insulation of HV and LV windings at CTL.**

#### **NOTE:**

If the total losses are found more than 10% of specified losses at 100% loading then apart from rejecting the lot, firm's balance order would be cancelled and such firms shall not be awarded any order for one year or in next tender of tendered rating to be opened / finalized whichever is later.

If the window height and limb centre are found more than 7.5 mm, then apart from rejecting the lot, firm's balance order would be cancelled and such firms shall not be awarded any order for one year or in next tender of tendered rating to be opened / finalized whichever is later.

No tolerance shall be allowed during CTL testing and in case any parameter which are to be tested in CTL are found beyond guaranteed parameters, the lot/ subplot shall stand rejected.

### **32.3 CHALLENGE TESTING CLAUSE:**

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

The challenged testing would cover the;

- 1) Measurement of magnetizing current.
- 2) No load losses test.
- 3) Load losses test
- 4) Temperature rise test.

The challenge test could be conducted at NABL accredited laboratory, like ERDA and CPRI Bhopal. If the values are within limit, the product gets confirmed else not confirmed. No positive tolerance in losses shall be permitted. If the product is not confirmed the manufacturer would pay the challenge fee and challenger would get the fee refunded. However as a redressal system the challenger (supplier) would be allowed to ask for fresh testing of two more samples from the store and the same be tested in a NABL laboratory (which shall be other than previously selected NABL accredited Lab.) in presence of party challenged, challenger and the utility. If any one or both sample does not confirm the test then the product is said to have failed the test. In such cases the manufacturer will be declared as unsuccessful manufacturer for the said product and balance supply shall not be availed and the order shall be cancelled with levy of maximum penalty.

### **33 GUARANTEE PERIOD:**

#### **Ia) For Out of Rajasthan State Firms**

Performance guarantee of the transformer(s) with LT protection unit shall be for the period of 60 (sixty) months from the date of despatch. The date of expiry of guarantee period shall be marked on the rating plate. Transformer(s) alongwith LT protection unit failed within such guarantee period shall have to be repaired / rectified free of cost expeditiously.

Firms shall lift G.P. failed Transformers from the stores within 60 days of its intimation positively and deliver the same after repair in next 60 days. In case firm fails to lift G.P. failed Transformer within 60 days, cost of the transformer(s) shall be withheld from its payment bills and in case firm fails to deliver transformer after due repair within 120 days, a penalty at the rate of 1/2% per week subject to maximum 10%, shall be levied for the late delivery of repaired Transformer(s). Firm shall lift G.P. failed transformers after furnishing safe custody bank guarantee, the slab of safe custody Bank Guarantee shall be as under.

**Safe custody Bank Guarantee :-**

In case if order is upto 1000 Nos. DT's the firm have to give safe custody Bank Guarantee for Rs.5.00 Lacks and if order is more than 1000 Nos. but upto 3000 Nos. then the safe custody BG for Rs.10.00 lacs and for orders more than 3000 Nos. DT's the value of safe custody BG shall be Rs.20.00 Lacks. In case firm fails to furnish the safe custody BG the amount equivalent to safe custody BG shall be deducted from firm's first bill due for payment. On furnishing of safe custody BG the amount so deducted shall be returned to the firm. The safe custody BG shall be valid for a period of 12 months over and above the normal GP. After a period of 16 months from normal GP the safe custody BG shall be returned back unless there is some specific direction from the purchaser.

**FOR JAIPUR DISCOM:**

**In case a central store is created in Jaipur Discom then all ACOS(s) shall deposit the G.P. failed distribution transformers to Central Store at Jaipur from where respective firm may lift these transformers for repair work after furnishing of required SCBG (as mentioned above). The charges for arranging the transportation of G.P. failed distribution transformers from site to centralize store (to and fro) as decided by JVVNL shall be recovered from you. The separate orders shall be issued by the respective Discoms if central stores is created by them.**

**Ib) For Rajasthan State Firms**

Performance guarantee of the transformer(s) with LT protection unit shall be for the period of 60 (sixty) months from the date of despatch. The date of expiry of guarantee period shall be marked on the rating plate. Transformer(s) alongwith LT protection unit failed within such guarantee period shall have to be repaired / rectified free of cost expeditiously.

**Firms shall lift G.P. failed Transformers from the stores within 60 days of its intimation positively and deliver the same after repair in next 60 days. In case firm fails to lift G.P. failed Transformer within 60 days, cost of the transformer(s) shall be withheld from its payment bills and in case firm fails to deliver transformer after due repair within 120 days, a penalty at the rate of ½% per week subject to maximum 10%, shall be levied for the late delivery of repaired Transformer(s). Firm shall lift G.P. failed transformers after furnishing safe custody bank guarantee, the slab of safe custody Bank Guarantee shall be as under.**

**Safe custody Bank Guarantee :-**

In case if order is upto 1000 Nos. DT's the firm have to give safe custody Bank Guarantee for Rs.5.00 Lacks and if order is more than 1000 Nos. but upto 3000 Nos. then the safe custody BG for Rs.10.00 lacs and for orders more than 3000 Nos. DT's the value of safe custody BG shall be Rs.20.00 Lacks. In case firm fails to furnish the safe custody BG the amount equivalent to safe custody BG shall be deducted from firm's first bill due for payment. On furnishing of safe custody BG the amount so deducted shall be returned to the firm. The safe custody BG shall be valid for a period of 12 months over and above the normal GP. After a period of 16 months from normal GP the safe custody BG shall be returned back unless there is some specific direction from the purchaser.

**FOR JAIPUR DISCOM:**

**In case a central store is created in Jaipur Discom then all ACOS(s) shall deposit the G.P. failed distribution transformers to Central Store at Jaipur from where respective firm may lift these transformers for repair work after furnishing of required SCBG (as mentioned above). The charges for arranging the transportation of G.P. failed distribution transformers from site to centralize store (to and fro) as decided by JVVNL shall be recovered from you. The separate orders shall be issued by the respective Discoms if central stores is created by them.**

**II)** All the transformers repaired/ rectified by the manufacturer under guarantee clause shall carry a further guarantee of 12 months after repair or unexpired guarantee of 60 months from the date of supply, whichever is later, after repair/ rectification. The bank guarantee equivalent to cost of repaired transformers shall be furnished after expiry of performance guarantee period to cover such repair guarantee. The purchaser also reserves the right to withheld the payment of supplier firm, under any other contract, if the performance of the supplier in repaired the failed transformers is not satisfactory. Each supplier shall invariably furnish the detailed information about the total number of transformers failed and repaired by them, every month after commencement of supplies.

**III)** In order to ascertain that transformers have successfully completed guarantee period the following details shall be provided on the transformer body:

**i)** A repair identification steel plate of size 75 x 75 x 2.5 mm duly engraved with following repair details shall be welded on the transformer body.

Firm's Name / Logo

TN

KVA

Sr.No.

Date of supply

**Ist time                      IIInd time                      IIIrd time**

Date of failure

Date of repair

Guarantee period  
extended.

**ii)** Such metallic plate fixed on first repair should not be removed at the time of second repair or any subsequent repair. However, necessary details of failure and repair shall be graved on the repair identification plate, each time it is repaired in guarantee.

**iii)** The repaired G.P. failed transformer shall be provided with 40 mm wide red colour band all around transformers including radiator each time it is repaired in G.P. Thus if a transformer is repaired three time in G.P. then there should be three coloured bands each of size 40 mm.

**iv)** All due care should be taken to ensure that the original name plate and identification plate provided should not be removed from the position at which they are fixed originally. In case it is felt that these are loose then it should be repaired suitably by welding or riveting.

- v) **Test checking of G.P. failed transformers will be allowed to the supplier at Nigam's store before lifting of G.P. failed distribution transformers to repair at supplier's works so that minor mistakes like loosing of connections/ replacement of fuse wire/ replacement of MCCB be carried out at Nigam's stores.**
- vi) **G.P. repaired Distribution may be got tested at CTL as per the sampling plan of new transformer except the physical opening test.**
- vii) **An undertaking shall be furnished by the firms, who will supply the amorphous distribution transformers that in case transformer fails beyond guarantee period, it shall be repaired by them on the rates, terms & conditions of Nigams existing CRC for repair of distribution transformers and in case firm denies to repair the transformers under CRC, such firms shall not be awarded order in subsequent tender.**

**NOTE: Firm shall keep the records for at least 8 years of transformers supplied by them**

#### **34. PRICE:**

The prices shall be quoted on F.O.R. destination basis in the manner detailed in schedule of prices (Schedule-IV) indicating details of ex-works price, excise duty, sales tax and freight & insurance charges and Entry Tax (for outside Rajasthan Firms) for delivery at our stores. The quoted prices shall be variable as per IEEMA price variation formula attached herewith at **Schedule-III-A**, without any ceiling for distribution transformers. The base date for price variation shall be the first date of calendar month previous to the month in which tenders are due to be opened. The prices shall be quoted after considering modvat benefits & benefit of VAT available to the supplier. The offers where the prices have not been quoted in prescribed manner are liable for rejection.

**The bidder shall submit transformer cost analysis sheet along-with the tender– including the cost of raw materials, overhead expenses, estimated profit, etc., for each rating separately, as per the annexure attached with the specification. In case the cost analysis sheet is not enclosed Nigam may consider to ignore such offers.**

**NOTE:** (i) Payments shall be made only after receipt of successful test report from our Central Testing Laboratory (CTL) on the samples selected from the material received at the stores, however, the payment priority shall be maintained from the date of submission of bills alongwith receipted challans to the Accounts Officer (CPC), JVVNL, Jaipur.

#### **35. DELIVERY SCHEDULE:**

The bidders are required to indicate the delivery period in the schedule attached herewith. The commencement period shall include the time taken for conducting the type test and approval of drawings etc. **The maximum commencement period should not be more than 45 days from the date of issue of P.O. Further the monthly delivery quoted shall be such that the entire offered quantity shall be completed within a period of 10 months from date of issue of P.O. including commencement period. The offers deviating in deliveries as per above schedule given, shall be considered as non-responsive. The monthly delivery shall be quoted irrespective of the offered / ordered quantity and offers with any conditional deliveries shall be considered as non-responsive.**

Monthly Delivery Schedule shall be kept. However, for the purpose of calculation of penalty on account of delay in delivery, at least 80% of the quantity should be supplied by the firm during monthly delivery schedule subjected to the condition that total quantity of 3 months will be completed in one quarter.

### **36. PERFORMANCE BANK GUARANTEE:**

i) Performance bank guarantee shall be furnished as per provision of relevant clauses of the General Conditions of Contract for amount equivalent to 10% of contract value. The bank guarantee shall be initially valid for 60 months and shall be further extended to cover the balance guarantee period whenever required by the purchaser. The performance bank guarantee shall be furnished in the prescribed proforma on a Rajasthan Govt. Non-Judicial stamp paper worth Rs.100.00. Out side the state of Rajasthan firms not furnishing the bank guarantee on non-judicial stamp paper of Rajasthan Govt. then they shall have to furnish a declaration certificate that the bank guarantee is duly stamped as per stamp duty applicable in their state. You shall also furnish manufacturer's warranty on non-judicial stamp paper worth Rs. 100/- of Govt. of Rajasthan as per clause No.1.41.2(a) of GCC in the prescribed proforma.

### **ALTERNATIVELY (FOR RAJASTHAN BASED FIRMS)**

You shall be exempted from furnishing of Performance Bank Guarantee in case you will furnish the Composite Bank Guarantee according to following slab of single order value (total F.O.R. value):

	Amount of Composite Bank Guarantee (CBG) in Rs.
i) Single order of value upto Rs.1.00 crore	- Rs.5.00 lacs
ii) Single order above Rs.1.00 crore to Rs.2.00 crores	- Rs.10.00 lacs
iii) Single order above Rs.2.00 crore to Rs.5.00 crores	- Rs.15.00 lacs
iv) Single order above Rs.5.00 crore to Rs.10.00 crores	- Rs.25.00 lacs
v) Single order above Rs.10.00 crore to Rs.15.00 crores	- Rs.35.00 lacs
vi) Single order above Rs.15.00 crore to Rs.25.00 crore	- Rs.50.00 lacs

This is subject to the condition that total value of orders in hand (under execution) is upto Rs.2.5 crore for each Composite Bank Guarantee (CBG) of Rs.5.0 lac. In case or otherwise, the manufacturer will arrange the CBG of corresponding value or furnish a separate PBG @ 2% of amount exceeding Rs.25.00 crore.

### **37. QUANTITY:**

<b>Sr. No.</b>	<b>Item/ Rating</b>	<b>Quantity in Nos.</b>
1.	11/0.433 KV, 160 KVA Aluminium Wound Conventional Type Three Star Rating Distribution Transformers. The prices shall be variable as per IEEMA Price Variation Formula without any ceiling.	1140

**Note :** The price bids shall be opened only of the firms who are having BEE Labelling.

**Schedule – I****SCHEDULE OF REQUIREMENT**

**160 KVA, 11/0.433 KV 3 PHASE ALUMINIUM WOUND THREE STAR RATING DISTRIBUTION TRANSFORMERS UNDER SPECIFICATION NO.JPD/SE/MM/SPO-VI/TN-2142.**

<b>S.No</b>	<b>ITEM</b>	<b>QUANTITY</b>
<b>1</b>	<b>160 KVA Rating Distribution Transformers</b>	<b>1140 Nos.</b>

**NOTE:**

- i) The price bids shall be opened only of the firms who are having BEE Labelling.
- ii) The quantities as mentioned in the schedule of requirements are tentative and may increase/decrease as per the requirement of the Nigam.

**SCHEDULE- II**

PRICE VARIATION CLAUSE FOR ALUMINIM WOUND DISTRIBUTION TRANSFORMERS  
COMPLETE WITH ALL ACCESSORIES AND COMPONENTS  
(Of ratings upto 160 KVA AND VOLTAGE UPTO 33 KV)  
Supplied against domestic contracts UNDER **TN-2142**

**This price variation clause is applicable for 'Aluminium Wound Distribution Transformers' with rating up to 160 KVA and voltages upto 33 KV. The clause is to be used for domestic contracts.**

The price quoted/ confirmed is based on the input cost of raw material / 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 following formula.

$$P = \frac{P_o}{100} \left\{ 13+15 \frac{AL}{AL_o} + 42 \frac{ES}{ES_o} + 10 \frac{IS}{IS_o} + 2 \frac{IM}{IM_o} + 6 \frac{TO}{TO_o} + 12 \frac{W}{W_o} \right\}$$

Wherein

- P** = Price payable as adjusted in accordance with the above formula.
- P<sub>o</sub>** = Price quoted/ confirmed.
- AL<sub>o</sub>** = Price of EC Grade Aluminium rods (Properzi rods) (refer notes)  
This price is as applicable on the 1<sup>st</sup> working day of the month, one month prior to the date of tendering.
- ES<sub>o</sub>** = C&F price of CRGO Electrical Steel Sheets (refer notes)  
This price is as applicable on the 1<sup>st</sup> working day of the month, one month prior to the date of tendering.
- IS<sub>o</sub>** = Wholesale price index number for 'Ferrous Metal' (Base: 2004-05=100)' (refer notes)  
This index number is as applicable for the week ending 1<sup>st</sup> Saturday of the month, three months prior to the date of tendering.
- IM<sub>o</sub>** = Price of insulating Materials (refer notes)  
This price is as applicable on the 1<sup>st</sup> working day of the month, one month prior to the date of tendering.
- TO<sub>o</sub>** = Price of Transformer Oil (Refer notes).  
This price is as applicable on the 1<sup>st</sup> working day of the month, one month prior to the date of tendering.
- W<sub>o</sub>** = All India average consumer price index number for industrial workers as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base 2001=100)  
This index number is as applicable on the first working day of the month, three months prior to the date of tendering.

For example, if date of tendering falls in May, 2008, applicable price of Aluminium (AL<sub>o</sub>) and Transformer Oil (TO<sub>o</sub>) CRGO Steel Sheets (ES<sub>o</sub>) and insulating material (IM<sub>o</sub>) should be as on 1<sup>st</sup> April, 2008 and wholesale price Index number for 'Ferrous Metal' (IS<sub>o</sub>) should be for the week ending first Saturday of February, 2008 and all India average consumer price Index No. (W<sub>o</sub>) should be for the month of Feb. 2008.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA (PVC) / TRF(R-1)/-/- 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 1<sup>st</sup> working day of the month, one month prior to the date of delivery.
- ES** = C&F price of CRGO Electrical Steel Sheets (refer note)  
This price is as applicable on the 1<sup>st</sup> working day for the month, one month prior to the date of delivery.
- IS** = Wholesale price index number for 'Ferrous Metal' (Base 2004-05= 100) (refer notes)  
This index number is as applicable for the week ending 1<sup>st</sup> Saturday of the month, three months prior to the date of delivery.
- IM** = Price of insulating Materials (refer notes)  
This price is as applicable on the 1<sup>st</sup> working day of the month, one month prior to the date of delivery.
- TO** = Price of Transformer Oil (refer notes)  
This price is as applicable on the 1<sup>st</sup> working day of the month, one 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 2001=100)  
This index number is as applicable on the first working day of the month, three months prior to the date of delivery.

For example, if date of delivery in terms of clause given below falls in Dec. 2008, the applicable price of aluminium (AL) and Transformer Oil (TO), CRGO steel sheets (ES) and insulating material (IM) should be as on 1<sup>st</sup> Nov. 2008 and wholesale price index number for 'Ferrous Metal' (IS) should be for the week ending first Saturday of Sept. 2008 and all India average consumer price index No. (W) should be for the month of Sept. 2008.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA (PVC) / TRF(R-1)/-/- one month prior to the date of delivery.

**The date of delivery (i.e. date of readiness of material) is to be considered as under:**

**When material is within delivery schedule :-** The date of delivery (i.e. date of readiness of material) shall be the date of receipt of inspection offer. In case if, a date is notified for readiness of material in the inspection offer then the date notified shall be considered as the date of delivery (i.e. date of readiness of material)

**When material is beyond delivery schedule :-** The date of delivery (i.e. date of readiness of material) shall be the date of receipt of inspection offer or the date of contracted delivery whichever is beneficial to Nigam.

**SCHEDULE II A****PRICES & PRICE VARIATION**

- a) The prices quoted shall be variable as per Price Variation Formula given in the Specification (Schedule-III-A) without any ceiling.
- b) If the price variation formula is changed, the same shall be applicable for the price variation. During the transit period when both old and new indices are being circulated, then the admissible Price Variation shall be applicable, which is advantageous to Nigam, and the period from which the old indices are discontinued then the P.V. shall be admissible with the new indices.
- c) The date of delivery applicable for claiming price variation shall be the date prevailing on the first day of Calendar month which shall be determined in the manner prescribed hereunder:-
  - (i) When the material is offered within stipulated delivery schedule : For allowing P.V. the date of delivery shall be considered the date on which material is notified as being ready for inspection or date of receipt of inspection call in the office.
  - (ii) When the material is offered after expiry of stipulated delivery schedule : For allowing P.V. in the cases supplies are made after the expiry of scheduled delivery, the price prevailing in the last month of the stipulated scheduled delivery or the date on which material is notified as being ready for inspection or date of receipt of inspection call in the office, whichever is beneficial to Nigam shall be allowed.
  - (iii) When the material is offered ahead of delivery schedule on the request of Jaipur Vidyut Vitran Nigam Limited : Normally supplies ahead of delivery schedule shall not be accepted. However in case of urgency of material, if supplies are accepted ahead of delivery schedule, PV shall be allowed on the basis of the material is notified as being ready for inspection or date of receipt of inspection call in the office.
  - (iv) When the material is offered ahead of delivery schedule by firm at their own and accepted by Nigam on the request of firm: Normally the request of the firm to accept the material ahead of delivery schedule will not be accepted. In case firm offers supplies ahead of delivery schedule at their own and such request is accepted by Nigam, the price prevailing in the last month of stipulated delivery schedule or the date on which material is notified as being ready for inspection or date of receipt of inspection call in the office, whichever is beneficial to Nigam shall be allowed.

**Schedule – III****JAIPUR VIDYUT VITRAN NIGAM LIMITED**

**A Govt. of Rajasthan Undertaking**  
**Prescribed technical specification for supply of**  
 (Name of Material/Equipment/Machinery/T&P etc.)

S.No.	Technical specification which material/equipment/ Machinery/T&P shall confirm confirm	Name of IS/other standard specification to which material should	Other particulars if any.	to
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Certified that we agree to all the aforesaid technical specification except at S.No..... for which our technical specification shall be as under:-

S.No.	Technical specification which material/equipment/ Machinery/T&P shall confirm confirm	Name of IS/other standard specification to which material should	Other particulars if any.	to
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**(Signature)**

Name & Designation  
with seal of the bidder.

**SCHEDULE-III-A****QUALIFICATION REQUIREMENT FOR 160 KVA THREE PHASE ALUMINIUM WOUND THREE STAR RATING DISTRIBUTION TRANSFORMERS (TN-2142)**

The bidder should fulfill following qualifying requirements for successful participation in the tender along with relevant documentary evidence supporting each qualifying requirement without which the offer shall be considered non-responsive & rejected.

I) The bidder should be a manufacturer of offered items. The offers from sole selling agent/ authorized dealers shall not be entertained

II) The bidder is required to quote for minimum 10% of tendered quantity, failing which the offer may be considered Non-Responsive.

**III)** The bidder should have designed, manufactured / fabricated, tested and supplied to utility / Discom / Govt. Departments Distribution Transformers at least 2XQQ (QQ being the quoted quantity) of similar or higher rating **in last three financial years from the date of opening of techno commercial bid (For quantity verification C.A. Certificate should be furnished). However, this will not be applicable for transformers having different number of phases i.e. quantity supplied in three phase transformers will not be considered for single phase and vice- versa.**

IV) The bidder shall furnish valid type test certificates of same rating of offered item from any CPRI / independent NABL Accredited laboratory/ Govt. approved lab. Such type test certificates should not be older than 3 years as on the date of opening of tender. For this purpose date of conducting type test will be considered. Type test conducted at supplier's own NABL accredited lab shall not be considered.

(V) The price bids only those bidders shall be opened who are having BEE labelling of the offered item.

**Note:-New state units & also those units located in Raj. which do not meet Qualifying Criteria may be considered for trial order subject to furnishing certificate of BEE labelling**

VI) The bidder should possess adequate testing facilities for carrying out routine & acceptance test of items as per relevant standard at their works. The bidder shall furnish documentary evidence in support for conducting routine & acceptance test.

VII) The bidder shall clearly indicate the deviations such as Technical Deviation & Commercial Deviations in the prescribed Performa only. The deviations indicated elsewhere in the bid shall not be accepted.

VIII) The bidder must clearly fill up each and every particular of Guaranteed Technical Particulars annexed with Technical Specification otherwise he will be responsible for Technical Non-Responsiveness.

**IX) PERFORMANCE CRITERIA:-**

i) If a bidder has supplied upto 50% of ordered quantity in previous tender upto date of opening of subsequent tender and scheduled delivery period expired, the bid of such bidder will not be opened in the Discom for that item.

ii) However, if the supplies have been completed for a quantity more than 50% but not completed upto date of opening of subsequent tender and scheduled delivery period expired, the quantity equal to the quantity pending in previous tender for that item shall be reduced from the subsequent tender quantity to be allocated to the bidder.

iii) If a bidder does not fulfill G.P. failed contractual obligations in previous tender(s) then quantity equal to the G.P. failed quantity pending for repair/ replacement shall be reduced from the subsequent new tender quantity for fresh item to be allocated to the bidder. This action will be in addition to the penal provisions applicable in respective tenders where supply is incomplete.

**X ) POOR RECORD OF PERFORMANCE AND DELIVERY:**

The bidder who have been black listed or with whom business relations have been severed in any of the state Discom shall not be considered. Severment of business relations will be done in case of following circumstances for the period and with the recovery mentioned against each:

i) When vendor does not accept order awarded on its accepted price and terms and conditions and does not comply with contractual formalities.	Forfeiture of EMD/cancellation of vendor registration to recover amount of EMD along with severment of business relations for three years from the date of issue of order.
ii) When vendor complies with contractual formalities but does not commence supplies.	Levy of maximum recovery on account of delay in delivery along with severment of relations for a period of 2 years from the date of issue of order or in next two bids whichever is later along with forfeiture of EMD / cancellation of vendor registration.

**XI ) Black Listing:**

Bids of the firms black listed shall not be opened. Bidder are liable for black listing for five years in any of the following circumstances ;

- i) There are sufficient and strong reasons to believe that the supplier or his employee has been guilty of malpractices such as bribery, corruption, fraud, vitiating fair under process including substitution of or interpolation in bids, pilfering or unauthorized use or disposal of NIGAM's material issued for specific works etc.
- ii) The supplier continuously refuses to pay Nigam dues after registered notice even after lapse of six months without showing adequate reasons and where the registering authority is satisfied that no reasonable disputes attracting reference to settlement committee or court of law exist for the supplier's action.

- iii) Where a supplier or his partner or his representative has been convicted by a court of law for offences involving moral turpitude in relation to the business dealings or where security considerations including suspected disloyalty to the Nigam so warrant.
- iv) If a registered supplier being non-renderer for supply but still submits applications giving his offer after receipt / opening of bids received after due process.

**NOTE : I.** If a supplier after having tendered for a work / supply or after negotiations acceptance of order gives applications voluntarily vitating the fair bidding process, it shall also tantamount to malpractice.

**NOTE: II.** Severment once done will continue for the notified period of debarment even if the dues are deposited prior to the expiry of such severment period.

However, the relations be deemed to have been restored after expiry of severment period mentioned in the order but the bid of such bidder will not be opened in that Discom where severment was done if the recoverable amount has not been deposited by the firm i.e. severment done by one Discom for non-supply and corresponding recovery will not be effective in other Discom after expiry of notified period but the bid of such bidder will not be opened in that particular discom if the firm has not deposited amount recoverable.

## **XII) APPEALS AND APPLICATIONS :**

Appeal against the order of black listing, debarment and severment can be filed before BOD. The BOD may reduced or waive the penalty if sufficient reasons / supporting documents are furnished by a supplier.

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**Schedule – III -B****BANK GUARANTEE IN LIEU OF FURNISHING OF TYPE TEST CERTIFICATE**

(On Rajasthan Non-Judicial Stamp Paper worth Rs.100/-)

To,

The Chief Engineer (MM)  
Jaipur Vidyut Vitran Nigam Limited  
Old Power House Premises,  
Near Ram Mandir, Bani Park,  
JAIPUR.

Dear Sir,

Whereas Jaipur Vidyut Vitran Nigam Limited, Jaipur (hereinafter called the Purchaser) has issued a tender enquiry under TN\_\_\_\_\_ for procurement of \_\_\_\_\_ (name of material).

Whereas M/s \_\_\_\_\_ (hereinafter called the bidder) has furnished a bid for supply of \_\_\_\_\_ to the Chief Engineer (MM), Jaipur Vidyut Vitran Nigam Limited, Jaipur or his nominated officer(s).

Whereas in accordance with the provision of the specification of the aforesaid TN\_\_\_\_\_, the bidder can deposit a bank guarantee in lieu of the requirement of furnishing the type test certificates.

Whereas M/s \_\_\_\_\_ (the bidder) have requested us (Name of the Bank) to furnish the bank guarantee, in lieu of the type test certificate, for an amount equivalent to Rs.\_\_\_\_\_ (in words also) only.

Under this Bank Guarantee, we (Name of the Bank) hereby undertake unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to the purchaser on his first demand without whatsoever right of objection on our part and without his first claim to the bidder, in the amount not exceeding (amount of guarantee in figures and words).

Payment pursuant to this undertaking will be demanded by the purchaser from the Bank and will be met by the Bank without question in the case in which the bidder, on receipt of the order and/ or after the acceptance of this tender, makes default in furnishing the required type test certificates. As to whether the occasion or ground has arisen for such demand the decision of the Chief Engineer (MM), Jaipur Vidyut Vitran Nigam Limited shall be final.

The liability of the Bank shall not at any time exceed Rs.\_\_\_\_\_ (Rupees \_\_\_\_\_).

The undertaking will be determined on but will notwithstanding such determination, continue to be in force till the expiry of 3 months from that date.

No indulgence or grant of time by the purchaser to the bidder without the acknowledgement of the Bank will discharge the liabilities of the Bank under this guarantee.

The guarantee herein contained shall not be affected by any change in the constitution of the bidder.

All disputes arising under the said guarantee between the Bank and the bidder or between the bidder and the purchaser pertaining to the guarantee shall be subject to the jurisdiction of Courts only at JAIPUR in Rajasthan.

The Bank further undertake not to revoke this guarantee during its currency except with the previous consent of the Chief Engineer (MM), Jaipur Vidyut Vitran Nigam Limited, Jaipur.

Notwithstanding anything contained herein before, the Bank's liability under this guarantee i.e. restricted to Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_) and the guarantee shall remain in force upto \_\_\_\_\_. Unless demand or claim in writing is presented on the Bank within three months from that date, the Bank shall be released and discharged from all liabilities there-under. However, the validity of the bank guarantee shall be extended as and when required by the purchaser.

IN WITNESS WHEREOF the Bank has executed these presents the \_\_\_\_\_ day \_\_\_\_\_ month \_\_\_\_\_ and year \_\_\_\_\_.

Yours faithfully,

(Bankers)  
EXECUTANT

Witnesses:

- 1.
- 2.

**JAIPUR VIDYUT VITRAN NIGAM LTD., JAIPUR**  
**SCHEDULE OF PRICES**

(Must be filled by the tenderer and returned with the tender)

The Superintending Engineer (            )

The Executive Engineer (            )

The Assistant Engineer (            )

JVVNL,  
 \_\_\_\_\_.

With reference to your invitation to tender against Specification No. \_\_\_\_\_ we agree to supply \_\_\_\_\_ our price are firm/ variable and given as follows:

S. No.	Particulars of Material	Quantity offered	Unit Ex-works Price (in Rs.)	Excise duty (Per Unit)		Cess on Excise Duty(Per Unit)		CST/VAT (Per Unit)		Freight (Per Unit) (In Rs.)	Insurance (Per Unit) (In Rs.)	Total Price (Per Unit) Col. No. (4+6+8+10+11+12)	Entry Tax @ ____ % on Col. 13 (In Rs.)	All adjusted unit F.O.R. Destination Price including Entry Tax Col. No.13+14	Total Contract Value (In Rs.)
				Rate	Amt	Rate	Amt	Rate	Amt						
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.

Note :-

- (i) The prices as quote above are valid for a period of \_\_\_\_days from the date of opening of this tender.
- (ii) The bidder is required to quote the prices in the above format only. Bids having prices quoted in other format/manner are liable to be ignored.
- (iii) The bidder must fill each and every column of the above format . Mentioning "extra/ Inclusive" in any of the column may lead for rejection of the price bid.
- (iii) No cutting/ overwriting in the prices is permissible.
- (iv) The unit Ex-work price to be indicated in Col. No. 4 should be exclusive of taxes & duties which are to be indicated in separate columns meant for the purpose. .
- (v) In case of price bid break-up is given component wise and also given sum total by the bidder but there is a difference between aggregate of component wise and sum total , then lesser of the two will be taken into account.

Signature of tenderer with  
 rubber stamp

**SCHEDULE-IV `A`**

**Must be filled-in by the tenderer and attach with technical bid (Part-I)**

To,

The Superintending Engineer (MM),  
Jaipur Vidyut Vitran Nigam Limited,  
Jaipur.

Dear Sir,

With reference to your invitation to tender against specification No. JPD/SE/MM/TN-2142 we agree to supply the following quantity:-

S. No	Particulars of item	Tendered Quantity	Qty. Offered	Justification of quantity offered as per Qualifying Requirement.	Status of Type Test Certificates.
1	2	3	4	5	6

1. The offer is valid for a period of 120 days from the date of opening of this tender.
2. The prices are variable with base date \_\_\_\_\_(one month prior to the date of opening of tender).
3. It is noted that the quantities as mentioned in the specification are approximate and we agree to supply any quantity as per your requirement.
4. The delivery shall strictly be in accordance with our delivery clause as given in **Schedule-VIII** of this specification. In case we fail to deliver the material as indicated in the clause No. 1.23, we are liable to pay recovery for delay in delivery as per clause No. 1.24 of this Schedule-II of this specification.  
The material shall conform to your specification No. JPD/SE/ MM/TN-2142 and as per relevant ISS in all respect.
5. We confirm that we agree to all the terms & conditions as well as the technical stipulations of your specification No. JPD/SE/MM/TN-2142 and there are no deviations other than as specified in the **Schedule VI (A&B)**.

Yours faithfully,

Signature of tenderer  
with stamp  
Dated

**Schedule – V**



**JAIPUR VIDYUT VITRAN NIGAM LIMITED**

**A Govt. of Rajasthan Undertaking**

Statement of guaranteed technical particulars and other performance data for supply of  
 ..... (Name of material) against specification  
 no.....

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S.No.      Particulars of technical & other performance data guaranteed.

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Certified that we agree to all the aforesaid technical particulars and other performance data  
 except following :-

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S.No.	Particulars of technical & other Performance data	Reasons for deviations/departure.
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**(Signature)**  
 Name & Designation  
 with seal of the bidder.

**Schedule – V(A)**



**ANNEXURE-A**  
 MANUFACTURER'S GUARANTEED TECHNICAL PARTICULARS

**160 KVA (AL) WOUND, 11/0.433 KV 3-STAR RATING DISTRIBUTION  
TRANSFORMER AGAINST TN-2142**

<b>S. No.</b>	<b>PARTICULARS</b>	<b>AS OFFERED (160 KVA)</b>
1.	Manufacturer's Name and Address	
2.	Service (Outdoor, continuously rated)	
3.	Type (CRGO / Conventional)	
4.	Continuous max. Rating under peak ambient temp. of 50 ° C	
5.	Rated voltage : (a) H V (b) L V	
6.	Rated current (a) H V (b) L V	
7.	Rated Frequency	
8.	No. of phases	
9.	Method of connection : (a) H V (b) L V	
10.	Vector group reference	
11.	Method of cooling	
12.	Max. temperature rise obtained by the transformer when run at the maximum ambient temp. of 50 ° C (a) Of top oil by thermometer (b) Of winding by resistance	
13.	Hottest spot temperature, at rated current and voltage, calculated corresponding to the yearly weighted average ambient temp. of 35 ° C	
14.	<b>Max. guaranteed No Load loss,</b> at rated voltage and rated frequency	
15.	<b>Total losses At rated current and at 75 ° C</b> i) At 50% loading ii) At 100% loading	
16.	Percentage impedance at full load and at 75 ° C	
17.	Percentage resistance at full load and at 75 ° C	
18.	Percentage reactance at full load	
19.	Efficiency at 75 ° C :- a) At unity power factor :- i) At 125% of full load ii) At 100% of full load iii) At 75% of full load iv) At 50% of full load v) At 25% of full load	

S. No.	P A R T I C U L A R S	A S O F F E R E D (160 KVA)
	b)At 0.8 power factor :- i) At 125% of full load ii) At 100% of full load iii) At 75% of full load iv) At 50% of full load v) At 25% of full load	
20.	Maximum efficiency	
21.	Load at which maximum efficiency occurs	
22.	% regulation at full load & at 75 ° C: a)At unity power factor b)At 0.8 power factor	
23.	Max. flux density at rated voltage and rated frequency	
24.	Percentage no load current at rated frequency (without any positive tolerance) a) At rated voltage b)At 112.5% rated voltage	
25.	Insulation level of transformer :- a) Impulse strength of HV b)Power frequency withstand voltage HV LV	
26.	H V Bushing details:- (a) Rating of the bushing (b) Impulse strength (c) Power frequency withstand voltage, dry and wet (d) IS reference	
27.	LV Bushing details :- (a) Rating of the bushing (b) Power frequency withstand Voltage, dry and wet (c) IS reference	
29.	<b>H V coil constructional details:-</b> (a) type of winding (b)No. of coils per phase (c)Conductor cross Section(min.) (d)Bare conductor dia (e)Covered conductor dia (f) Phase current (H V) (g)Current density (h)Coil I. D (i)Coil O.D (j)Coil axial length (k) Total no. of turns per phase (l) Resistance per ph. at 75 ° C (m) Weight of covered conductor per	

S. No.	P A R T I C U L A R S	A S O F F E R E D ( 1 6 0 K V A )
	transformer (n) Inter layer insulation (O) No. of vertical spacers per circle (in the annular gap between LV & HV)	
30.	<b>LV coil constructional details:-</b> (a) type of winding (b)No. of coils per phase (c) Conductor cross section(min.) (d)Bare conductor size (e)No. of conductors in parallel (f)Covered conductor size (g)Phase current ( L V ) (h)Current density (i)Coil I. D. (j)Coil O.D. (k)Coil axial length (l)Total no. of turns per phase (m) Resistance per phase at 75 ° C (n) Weight of covered conductor per transformer (o) Inter layer insulation (p) No. of vertical spacers per circle	
31.	Minimum external clearances in air (with B M C s mounted) (a) HV phase to phase (b) HV phase to earth (c) LV phase to phase (d) LV phase to earth	
32.	Minimum internal clearances (in oil) (a)Between HT outside surface and tank inside (non bushing side) (b)Between HT outside surface & tank inside ( HV & LV bushing side) (c)Between HV windings and yokes (end insulation) (d )LV windings & yokes (e) From top of yoke to inside of top cover of tank (with gasket) (f)LT / HT coil annular gap. (bare Conductor) (g)Radial clearance between core & LV coil (Bare conductor) (h)Phase to phase Clearance between Limbs (HV Conductors), with a minimum of 2 Nos. x 1mm Press board covering the tie rods (i) Minimum thickness of locking Spacers between HV coil sections	

S. No.	P A R T I C U L A R S	A S O F F E R E D ( 1 6 0 K V A )
	(including 1 mm ring of press board) (j) Maximum clearance of core channels from tank walls at each end	
33.	Tank details :- (a) Clear inside tank dimensions: (i) Length (ii) Breadth (iii) Height (b) Tank sheet thickness (i) Sides (ii) Top (iii) Bottom (c) Tank stiffener details (i) No. of stiffeners around the tank (ii) Size	
34.	Cooling radiator details : (a) Cooling tube size (b) Total length of tubes used (c) Whether cooling calculations attached? (d) No. of tubes on each side	
35.	Core Details	
(i)	Size of core frame channels	
(ii)	Core diameter (mm)	
(iii)	Core stud details	
(iv)	Core coil assembly base supports ( 2 Nos )	
(v)	Window Height (mm)	
(vi)	Limb Center (mm)	
(vii)	Tai Rod Details	
39.	Transformer weight details: (a) Core coil assembly (b) Tank with fittings (c) Oil weight (d) Total weight of transformer (e) Volume of oil (minimum quantity for first filling)	
40.	Overall dimensions (a) Length (b) Breadth (C )Height	
41.	<b>Whether the bidder is an ISO : 9001 / 9002 certified company?</b>	

**(Signature)**  
Name & Designation  
with seal of the bidder

**Schedule – VI (A)**



**JAIPUR VIDYUT VITRAN NIGAM LIMITED**

**A Govt. of Rajasthan Undertaking**

**DEPARTURE/DEVIATION FROM TECHNICAL SPECIFICATION**

The bidder shall state under this schedule the departure from the Purchaser's specification in respect of technical is as under:-

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S.No.	Main Deviations from Technical Specification.
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Certified that we agree to all the technical specification of the NIT except for the deviation to the extent indicated above.

**(Signature)**  
Name & Designation  
with seal of the bidder.

**Schedule – VI (B)**



**JAIPUR VIDYUT VITRAN NIGAM LIMITED**

**A Govt. of Rajasthan Undertaking  
DEPARTURE FROM COMMERCIAL TERMS & CONDITIONS OF THE  
SPECIFICATION**

The bidder shall state under this schedule the departure from the Purchaser's specification in respect of Commercial terms & conditions:-

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S.No.	Main Deviations from Specification.
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Certified that we agree to all the commercial terms & conditions as laid down in General Conditions of Contract to the specification except for the deviation to the extent indicated above.

**(Signature)**  
Name & Designation  
with seal of the bidder.

**Schedule – VII****JAIPUR VIDYUT VITRAN NIGAM LIMITED****A Govt. of Rajasthan Undertaking****LIST OF PAST SUPPLIES**

The bidder shall state under this schedule whether material and equipments, similar to those offered in the tender have been previously supplied by him. A list shall be given of such orders executed by him together with information regarding the names of purchasing organizations, quantities supplied and when the supplies were effected. This list should be in form given below:-

S.No.	Detailed particulars of items supplied	Qty in MT	Order No. & Date	Name & details of purchasing authority	Date of Completion	of
1	2	3	4	5	6	

If executed partially be mentioned (M.T.)	whether still to be executed	Delivery stipulated in order	Remarks to (Qty. in
7	8	9	10

**Note:** Separate schedules are to be furnished by the bidder for past supply to the JVVNL/AVVNL/JdVVNL, other State Electricity Boards and other Departments /Organisations.

**Signature)**

Name & Designation with seal of the bidder.

**SCHEDULE-VIIA****TN-2142****TO WHOMSOEVER IT MAY CONCERN**

This is to certify that M/s. \_\_\_\_\_ (Complete with address) have manufactured and supplied the goods / equipments / material during the following financial year(s) to the Electrical Utilities / Government Departments / Discoms/ SEBs as detailed out below:

**FOR THE LAST THREE FINANCIAL YEARS FROM THE DATE OF OPENING OF TECHNO-COMMERCIAL BID.**

S.No	Financial year in which material supplied	Detailed Particulars of item(s) supplied	Name and particulars of purchasing authority	Order No. & date against which item(s) supplied	Unit	Ordered		Actual Supplied up to		Remarks
						Quantity	Value (Rs)	Quantity	Value (Rs)	
1	2	3	4	5	6	7	8	9	10	11

Signature ,  
Name & Designation  
With Seal of the Bidder  
Date \_\_\_\_\_  
Place \_\_\_\_\_

Signature of C.A  
Name :  
Address:  
Membership No

The above particulars are true and correct based on explanations, records and books of accounts produced before us. Further the above certificate issued on the request of the company

CA Firm ( \_\_\_\_\_ )

**Note:- The C.A. certificate must be signed by the bidder and C.A. firm. The details i.e. address of C.A. & membership No. shall clearly be mentioned on C.A. certificate. In case C.A. certificate is not signed by the bidder/furnished without membership No. & address of C.A. then same may not be considered for which responsibility rests with the bidder.**

**Schedule – VIII****JAIPUR VIDYUT VITRAN NIGAM LIMITED****A Govt. of Rajasthan Undertaking****DELIVERY SCHEDULE****PART-A**

The delivery schedule of the material by the Purchase Officer is as mentioned hereunder:-

S.No.	Particulars of Material	Commencement period per Month.	Rate of supply per Month material	Period for completion of delivery of entire
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**PART-B**

In case bidder deviates from the delivery schedule mentioned by the purchaser in Part-A then the delivery schedule shall be indicated/mentioned by the bidder as under:-

S.No.	Particulars of Material	Commencement period per Month.	Rate of supply per Month material	Period for completion of delivery of entire
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- Note:**
1. During the commencement period the process of model assembly and submission of B.O.M. for approval shall be got completed.
  2. During the commencement period the contractual formalities shall be got completed.

**(Signature)**

Name & Designation  
with seal of the bidder.

**Schedule – IX****JAIPUR VIDYUT VITRAN NIGAM LIMITED****A Govt. of Rajasthan Undertaking**

List of Equipments and Technical Hands Available with the Firm

(To be filled in by the bidders & enclosed with the bid)

Manufacturers and / or their authorized agents who are quoting against this bid are requested to furnish the following information along-with the bid. The Purchaser will have the discretion to ignore the bid without the under noted particulars and/or ignore the bid particulars.

1. Name and Address of Manufacturer.
2. Place where works exist.
3. Details of machinery particularly with B.H.P. of each item installed.
4. Details of staff employed in the works.
5. Date when started the manufacturing of item under reference.
6. List of items manufactured.
7. Literature and drawings of items manufactured showing their description, size, design and other important technical particulars.
8. Details of order so far, executed alongwith the names of organization to whom supplied.
9. Manufacturing capacity.
10. Is the workshop open for inspection by the representative of the board, if required?
11. Statement of financial resources and Banking Reference alongwith Balance-Sheet for previous two years.
12. Testing facilities available for the manufactured articles in the testing laboratory of works.
13. Whether the Firm is a small/medium/large scale industry.
14. Registration No. with :-
  - i. Small Scale, National/State.
  - ii. DGTD
  - iii. State Industries Department.

**(Signature)**

Name & Designation  
with seal of the bidder.

**Schedule – X****GENERAL PARTICULARS ABOUT THE TENDER IN BRIEF**

**JAIPUR VIDYUT VITRAN NIGAM LIMITED  
(MATERIAL MANAGEMENT)  
NEAR RAM MANDIR , BANI-PARK, JAIPUR-302006**

**TELEPHONE: - 0141-2202607****FAX: - 0141-2202025****SPECIFICATION FOR SUPPLY OF 160 KVA, 11/0.433 KV 3 PHASE ALUMINIUM  
WOUND THREE STAR RATING DISTRIBUTION TRANSFORMERS UNDER  
SPECIFICATION NO.JPD/SE/MM/SPO-VI/TN-2142.**

LAST DATE OF RECEIPT OF TENDERS:	03.06.2011 up to 2.30 PM
DATE OF OPENING OF TENDER:	03.06.2011 (AT 3.00PM)
EARNEST MONEY TO BE DEPOSITED	RS.5,00,000.00(Rs. Five Lac only/ Exemption Certificate or Vender Registration of class "A" category )
COST OF SPECIFICATION:	Rs.2500.00 (non refundable)
VALIDITY	120 DAYS FROM THE NEXT DATE OPENING OF TECHNO-COMMERCIAL BID.

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**NOTE : The bidders, in their own interest are requested to read very carefully Section-I (Instruction to Bidders), Section-II (General Condition of Contract) & Section-III (Technical Specification) before filling the bid. The Bid documents be downloaded from JVVNL website [www.jaipurdiscom.in](http://www.jaipurdiscom.in) . No hard copy of the bidding documents will be provided to the bidders through this office. In case of any discrepancy found in the bidding documents downloaded from the website and appended with the bid (as a bid document) and the original copy of such document available in the office of Superintending Engineer(MM), Jaipur discom, Jaipur then the copy available with Superintending Engineer(MM), Jaipur discom, Jaipur will be considered as final document for all purposes. The cost of Bid document as published in NIT shall be furnished along with downloaded bid document in the manner prescribed in bid document.**

1. **Furnishing of Proof of deposition of Cost of Bid Document, Earnest Money/ exemption certificate as per Clause 1.03 & 1.16 of Section-I (Instruction to Bidder) along with downloaded Bid Document is essential otherwise the "BID OFFER" will not be opened. However the bidders who get themselves registered with JVVNL as per Clause No. 1.5.3 of Section-II (General Condition of Contract) before submitting of bid documents against this bid enquiry for supply of quoted items under appropriate category are not required to furnish Earnest Money Deposit. They shall furnish the proof of such valid registration with their bid. Cost of Bid Document shall be furnished in the form of Crossed Bank Draft / Bankers Cheque payable in the name of "A.O(MM), JVVNL, JAIPUR". EMD if required shall be furnished in accordance with Clause No. 1.03.1 of Section-I (Instruction to Bidders)**

2. The Central and State Govt. undertakings are exempted from furnishing of Earnest money subject to furnishing of such certificate / documentary evidence in support of their being Govt. (Central/State) undertaking.

3. The bidder shall quote the Prices strictly in the manner prescribed in Clause No. 1.09 of Section-I (Instruction to Bidders) & Clause No. 1.33 of Section-II (General Conditions of Contract) in **Schedule-IV** otherwise their bid is liable for rejection. The price quoted should be variable without any ceiling as per IEEMA price variation formula annexed in **Schedule - II**. Base date for price variation shall be the first day of calendar month, one month prior to the date of tender opening.

4. **The bid offer shall be furnished in two parts & shall comply all provisions of Clause No. 1.02 Section-I (instruction to Bidders) and the Bid offer shall be furnished in the following manner :-**

- i) **First envelope containing proof of deposition of cost of Bid documents & EMD. Name of item, bid no., time of bid submission, due date for opening of bid and the word 'Envelope-I & Cost of bid documents and Earnest Money / Valid Registration Certificate under relevant class / A certificate of being a Rajasthan / Central Govt. undertaking' should be clearly written on the front side of the envelope.**
- ii) **Second envelope for techno-commercial bid. Name of item, bid no., time of bid submission, due date for opening of bid and the word**

**'Envelope – II & Techno-Commercial Bid' should be clearly written on the front side of the envelope.**

- iii) **Third envelope for price bid. Name of item, bid no., time of bid submission, due date for opening of bid and the word 'Envelope – III & Price Bid' should be clearly written on the front side of the envelope.**

*Note : Envelope III containing price bid will be kept in the safe custody of the concerned engineer / officer. It will be opened at a later date in respect of those bidders whose offers are found / adjudged technically and commercially acceptable. The date of opening of "Price Bid" shall be intimated to successful bidders in due course of time. In case of deviation from the stipulated clauses of bid specifications, price bid of the bidder will not be opened.*

- iv) **Fourth envelope containing above three envelopes. Name of item, bid no., time of bid submission and due date for opening of bid should be clearly written on the front side of the envelope. (All the above envelopes shall be duly sealed individually).**
- v) **The bidder shall ensure that bid is furnished / submitted strictly in the manner detailed in the Specification.**

(PLEASE NOTE THAT BID RECEIVED AFTER SPECIFIED TIME ON DUE DATE OF OPENING WILL NOT BE ACCEPTED AND SUCH OFFERS SHALL BE IGNORED)

5. The bids not accompanied with qualification requirement , technical requirement indicated in the specification and other requirement given here under will be considered as incomplete offer and sufficient grounds for offer to be passed over:
- i) Capacity, capability and competency proofing documents.
    - a) Capacity /orders of similar and higher rating of tendered equipment booked as on date of bidding with type and rating and construction details of equipment for which order received be indicated.
    - b) Copy of purchase orders of Erstwhile RSEB /SEB`S / Electric Utilities / Govt. Departments / Discoms for similar or higher rating equipment latest executed.
  - ii) Year wise past experience for last 5 years of similar or higher rating of tendered equipment.
  - iii) The details of testing facilities available at the works and copies of latest type test certificates, carried out on similar ITEM.
  - iv) Quality assurance plan.
  - v) Complete guaranteed technical particulars, out lines and general arrangement drawings along with Bill of Material.
6. Bids without Section-I, II, III & Schedules (I to X) shall be rejected.

7. Bids shall be furnished in single copy.
8. JVVNL has the right to reject any offer on the basis of track record of poor performance in execution of previous order / equipment supplied /after sales service while evaluating the Techno-Commercial bid.
9. JVVNL reserves the right to accept minor deviations in standard terms and conditions and also in technical and constructional features as specified in the technical specification **(Schedule-III)**.
10. Deviation of any kind shall not be quoted in price bid, if found quoted, the same shall be ignored.
11. The following facilities are to be provided by the supplier at his own cost to the inspecting officer of Nigam (JVVNL).
  - i) Suitable accommodation.
  - ii) Local conveyance between arrival point, place of stay, works and departure point.
  - iii) The supplier shall assist in arranging return ticket and reservation on the request of the inspecting officer for which the payment shall be made by the inspecting officer. In case of joint inspection, single or shared double room accommodation shall be provided

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