

**JODHPUR VIDYUT VITARAN NIGAM LIMITED**  
**MATERIAL MANAGEMENT CIRCLE**  
**NEW POWER HOUSE, INDUSTRIAL AREA, JODHPUR-342003**  
**Phone: (0291)2742223/Fax: (0291) 2746539/E-Mail-[semmcjdvvnl@gmail.com](mailto:semmcjdvvnl@gmail.com)**

**TENDER SPECIFICATION NO. JdVVNL/SE (MM&C)/EIAI/TN-1368**

Tenders are hereby invited in e-tender system for Purchase of **16 KVA, 11/0.433 KV, Outdoor Type, Energy Efficiency Level-2 (Star 1 Rating) Aluminium Wound (CRGO /Amorphous Core) Distribution Transformers With LV Bushing cover Cum Metering & Protection Box Having Provision of Metering on LV Side.**

Tenders are to be submitted online in electronic format on website <http://eproc.rajasthan.gov.in>. The details are as under-

<b>S. No.</b>	<b>Name of Item</b>	<b>Quantity (Approx.)</b>
1.	<b>SUPPLY OF 16 KVA, 11/0.433 KV, OUTDOOR TYPE, ENERGY EFFICIENCY LEVEL-2 (STAR 1 RATING) ALUMINIUM WOUND (CRGO /AMORPHOUS CORE) DISTRIBUTION TRANSFORMERS WITH LV BUSHING COVER CUM METERING &amp; PROTECTION BOX HAVING PROVISION OF METERING ON LV SIDE.</b>	<b>8,971 Nos.</b>

<b>A</b>	<b>SHORT TERM NIT No.</b>	<b>TN-1368</b>
<b>B</b>	Cost of tender specifications	<b>Rs. 2500.00 + GST@18% = Rs. 2,950.00 (Rs. Two Thousand Nine Hundred &amp; Fifty Only)</b>
<b>C</b>	Processing fee of RISL	<b>Rs. 1000.00 (One Thousand Only)</b>
<b>D</b>	Earnest money	<b>Rs. 5.00 Lacs /Exemption Certificate / Vendor Registration of Class "A".</b>
<b>E</b>	Validity	<b>120 days from the next date of opening of techno-commercial bid.</b>
<b>F</b>	Base date for price variation	<b>The base date will be 01.09.2017 irrespective of date of tender opening.</b>

**IMPORTANT DATES**

<b>S.N.</b>	<b>Events</b>	<b>Date &amp; Time</b>	<b>Location</b>
1	Date of downloading of tender specifications	Up to 10.10.2017 (06:00 PM)	<b><a href="http://www.jdvvnl.com">www.jdvvnl.com</a> &amp; <a href="http://eproc.rajasthan.gov.in">http://eproc.rajasthan.gov.in</a></b>
2	Deposit of cost of Tender Specifications, Processing fee & Earnest Money	Up to 10.10.2017 (4:00 PM)	Office of Sr. A.O (Cash & CPC), JdVVNL , New Power House, Industrial Area, Jodhpur
3	Last Date & time of submission of electronic bid	Up to 11.10.2017 (12:00 NOON)	<b><a href="http://eproc.rajasthan.gov.in">http://eproc.rajasthan.gov.in</a></b>
4	Opening of Technical Bid	<b>11.10.2017 (3:00 PM)</b>	<b><a href="http://eproc.rajasthan.gov.in">http://eproc.rajasthan.gov.in</a></b>
5	Opening of Price Bid	To be intimated separately to the qualified bidders	<b><a href="http://eproc.rajasthan.gov.in">http://eproc.rajasthan.gov.in</a></b>

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1. Tender documents will be made available on e-Tendering portal **www.eproc.rajasthan.gov.in & www.jdvvnl.com** for viewing. The bidders, in their own interest are requested to read very carefully the tender document before submitting the bid only through online on website **www.eproc.rajasthan.gov.in** up to the time & date as specified above.
2. 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&C), Jodhpur Discom, Jodhpur then the copy available with Superintending Engineer (MM&C), Jodhpur Discom, Jodhpur will be considered as final document for all purposes.
3. The **cost of tender specification** (non-refundable) and **EMD** in Demand draft/ Banker's cheque in favour of the Senior Accounts Officer (Cash & CPC), JdVVNL, New Power House, Industrial Area, Jodhpur (payable at Jodhpur) and **tender processing fees of Rs. 1,000/-** (non-refundable) payable by Demand Draft in favour of Managing Director, RISL (payable at Jaipur) can be deposited in the office of the Senior Accounts Officer (Cash & CPC), JdVVNL, New Power House, Industrial Area, Jodhpur upto 4:00 p.m. upto one working day prior to schedule date of opening of bid. **However the bidders who possess valid vendor registration issued by JdVVNL as per Clause No. 1.5.3 of Section-II (General Condition of Contract)** for supply of quoted items under appropriate category are not required to furnish Earnest Money Deposit. 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. **They shall upload the proof of such valid registration/exemption certificate with their bid**

4. The bidders are required to **upload the** receipt of depositing all above payments along with their tender at the relevant place on the scheduled date & time otherwise their bids are liable to be rejected
5. Eligible bidders should submit their bid well in advance instead of waiting till last date. JdVVNL will not be responsible for non-submission of Bid due to any website related problems.

**Note: - All eligible interested bidders are required to get enrolled on e-Tendering portal <http://www.eproc.rajasthan.gov.in/nicgep/app>**

**Section - III**

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Phone: (0291)2742223/Fax: (0291) 2746539/E-Mail-semmcjdvvn1@gmail.com**

**TECHNICAL SPECIFICATION**

**FOR**

**16 KVA, 11/0.433 KV, OUTDOOR TYPE, ENERGY EFFICIENCY LEVEL-2 (STAR 1 RATING) ALUMINIUM WOUND (CRGO /AMORPHOUS CORE) DISTRIBUTION TRANSFORMERS WITH LV BUSHING COVER CUM METERING & PROTECTION BOX HAVING PROVISION OF METERING ON LV SIDE.**

**AGAINST TN-1368**

**Section - III****TECHNICAL SPECIFICATION FOR SUPPLY OF 16 KVA, 11/0.433 KV, OUTDOOR TYPE, ENERGY EFFICIENCY LEVEL-2 (STAR 1 RATING) ALUMINIUM WOUND (CRGO /AMORPHOUS CORE) DISTRIBUTION TRANSFORMERS WITH LV BUSHING COVER CUM METERING & PROTECTION BOX HAVING PROVISION OF METERING ON LV SIDE AGAINST TN- 1368****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 BIS Level-2 (STAR-1 RATING), 11KV/433 V, three phase, 50 Hz, double wound core type, outdoor Type, Aluminium Wound Distribution Transformers of 16 KVA ratings, 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. 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 Tender / supplier shall bind himself 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 Transformer, 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.

Sr. No.	Specification	Details about	International & internationally recognized standards.
1	IS: 1180 (PART-I)/2014	Specifications for outdoor type oil immersed Distribution Transformer upto and including 2500 KVA, 33 KV Class.	IS: 1180 (PART-I)/2014

2	IS:6600/1978	Guide for loading of oil immersed Transformers	IEC 76
3	IS:335/1983	New insulation oils for Transformers	BS 148, D-1473, D-1533 – 1934, IEC PUB 296
4	IS:3347 (Part-I/ Sec. 1 & 2)	Dimension of Porcelain parts & Metal parts for Transformer bushing (1.1KV).	DIN 42531 to 33
5	IS:3347 (PART-III / Sec-1 & 2) & IS:8603:2008	Dimensions of Porcelain( parts & Metal parts) for Transformer bushing for use in heavily polluted atmosphere 12/17.5 KV,24 KV and 36KV( amalgamating IS 8603(Part1,2 & 3):1977	
6	IS:7421	Porcelain Transformer Bushings for low voltage – upto 1 KV.	
7	IS:2099/1986	Porcelain Transformer bushing for AC volts above 1000 volts.	
8	IS:3639/1966	Fittings & accessories for Transformers	
9	IS:1866/1978	Code of practice for maintenance & supervision of insulating oil in service.	
10	IS:5484	Specifications for Aluminium wire rods.	ASTM B – 233
11	IS:9335	Specifications for insulating kraft paper.	IEC 554
12	IS:1576	Specifications for solid insulating press Boards for electrical purposes.	IEC 641
13	IS:616 (Part I)	Specification for paper covered Aluminium round conductors	
14	IS:6162(Part II)	Specification for paper covered Aluminium rectangular conductors	
15	IS:104	Ready mixed paint, brushing zinc chromate, painting	
16	IS:649	Testing of steel sheets and strips for magnetic circuits.	
17	IS:2362	Determination of water content in oil for porcelain bushing transformers.	
18	IS: 4257	Dimensions for clamping arrangements for bushings.	
19	IS 6160	Rectangular conductor for electrical machines.	
20	IS:10028	Selection, Installation and maintenance of transformers	
21	IS: 3401	Silica gel	
22	- REC Specification No. 2 - REC Specification No. 39/1993 - CEA Specification Chapter 4		

**Note: - Besides above changes, the technical parameters of the specifications wherever are deviating from the IS: 1180 (Part-I/2014), the same shall be in accordance with IS: 1180 (Part-I/2014) and its latest amendments, if any and the changes where the IS: 1180 (Part-I/2014) is silent for technical parameters, same shall be applicable as per Discom specification.**

Material conforming to other internationally accepted standards, which ensure equal or better 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 Transformer 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) The transformer shall conform to the following specific parameters:	
i) Continuous rated capacity	: 16 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	: 0.84 A
Line Current LV	: 21.33 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 %
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 max. Allowable losses at rated voltage and frequency and at 75 Deg. C. shall be as under:

<b>RATING (KVA)</b>	<b>Total losses (watts) at 75 Deg. C at 50% loading (Max.)</b>	<b>Total losses (watts) at 75 Deg. C at 100% loading (Max.)</b>
<b>63</b>	<b>135</b>	<b>440</b>

The above specified loss values are maximum guaranteed, **as per Energy Efficient level-2**, 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.

**NOTE: The Star Rating will be as per notification letter dater 16.12.2016, Ministry of Power, Govt. Of India, New Delhi.**

**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 Maximum measured total losses (No load at rated excitation + Load loss at max. current tap at 75°C) at 100% loading shall be supplied during temperature rise test.

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.**

The Hot spot temperature at annual weighted average ambient temperature of 35° C shall not exceed 98° C, when calculated as per IS: 2026 (Part-II)

**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 and at 75°C shall be **4.5%** with plus/minus (+/-) 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 (+/-) 3% 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:

PARTICULARS	16 KVA
a) Between HT & LT	11 mm
b) Between HT & tank inside.	
Non Bushing Side	25 mm
Bushing side	40 mm
Between Sections of HV winding	<b>11 mm</b>
Between HV winding	10 mm with press Board
Between HV winding and Yoke ( at ends)	20 mm with rings
Between LV winding and Yoke ( at ends)	5 mm
Between yoke & Inside of tank top cover( With Gasket)	125 mm
Between yoke and Tank Bottom	40 mm
Between LV winding & Core	3.5 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	12 KV	75 KV (Minimum)	28 KV
0.433 KV	----	----	3 KV

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

**14. HEAT DISSIPATION (COOLING)**

The transformers shall be capable of giving a continuous output without exceeding the specified temperature rise.

Cooling area of the tank/radiators should be sufficient to dissipate the guaranteed losses satisfactorily. 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).

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

### **i) MATERIALS:**

The conductor used for winding shall consist of high conductivity , non oxidising solid drawn aluminium with super enamelled / DPC & shall be used for 11 KV class transformers. **The covering shall be conformed applicable ISS.**

### **ii) CONSTRUCTION:**

The High-tension windings shall be concentric with the Low-tension windings and the HV conductor size of such transformers may be kept as **0.83mm(min.)**. 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/ round 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 preshrank 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.

**Max. Nos. of coils on HV side shall be 2(two) per phase for 16 KVA 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 2(two).**

### **Current Density:**

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

Rating	Current density in Amp. / mm Sq.	
	16 KVA	<b>HV winding</b>
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 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 **25x4.5** mm for 16 KVA Transformers. 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 LT Coil may be either even or odd in numbers but minimum layers shall be two.
- LV star point shall be formed of Aluminium flat of sufficient strength. Leads from winding shall be connected to the flat by brazing.

- d) "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.

## **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** with specific loss of 0.89 watt per kg. at 1.5 Tesla or any other combination of better grades with any thickness subject to maximum specific loss of 0.89 watt per kg. at 1.5 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. (as per amended IS:1180 (Part-I/ 2014) Actual core design along with calculations in support of it should be enclosed with the offer.

(v) Flux density at rated voltage and frequency of core and yoke shall not be more than **1.60 Tesla. The Over fluxing shall be limited to 12.5% of rated value and flux density at 112.5% of rated voltage does not exceed by 1.9 Tesla.**

The No Load Current (magnetising current) 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
16 KVA	3%	6%

**The tolerance on magnetizing current shall be +30% on declared value of magnetizing current as per IS: 2026.**

**vi) Core clamping:**

- i. MS Channel of 75 x 40 mm min. size shall be used on top and bottom (for stacked core transformers).
- ii. 2 x 12 mm high tensile bolts to be used in parallel at each end.
- iii. Channel on LV side to be reinforced at equidistance, if holes/cutting is done for LT lead in order to avoid bending of channel.
- iv. MS channel shall be painted with varnish or oil-resistant paint.
- v) Tie-rods : 4 Nos. of M12 M.S steel rods shall be effectively insulated.
- vi) All top and bottom yoke nuts & bolts and tie rods shall be painted with oil and corrosion-resistant paint and phosphate coated paint for tie rods before use.
- vii) Only prime quality CRGO sheets should be used in the transformers and no Second/Defective/ Scrap CRGO finds way into transformers.

#### **B. AMORPHOUS METAL:**

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

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

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

c) The transformer core shall be suitable for over fluxing due to combined effect of voltage and frequency upto 12.5% without injurious heating at full load conditions and shall not get saturated. The 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. shall be provided as per details given hereunder:

Sr. No.	Item	Particulars
a)	Tie rods	Minimum 4 Nos. of 12 mm each properly insulated and covered with SRBP tubes. Tie rods shall also be provided with lock nuts.
b)	Core studs	Minimum 4 Nos. of 12 mm each properly insulated and covered with SRBP tubes. The core studs shall also be provided with lock nuts for stack core.
c)	Spacers	Minimum 4 Nos. dovetail type with min. peripheral coverage of 30%.
d)	Support of core assembly base	2 Nos. MS channels of 75x40 mm
e)	Channels for clamping core coil assembly	4 MS Channels of 75 x 40 mm size (applicable for stack core 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 center 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 / an 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) Transformer 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) (i) Minimum size of MS Sections to be used in construction of transformer tanks shall be as under:

S.N.	I T E M S	16 KVA
1	Tank Cover plate thickness (mm)	5.0 t
2	Tank Sides wall thickness (mm)	3.15 t
3	Tank bottom plate thickness (mm)	5.0 t
4	Conservator body (mm)	2.0 t
5	Detachable Conservator side Cover	N.A.
6	No. of stiffeners (To be welded with one face while the other side of the angle forms inverted "L")	1
7	Size of M. S. stiffener (mm)	40x40x 6 angle
8	Tank Top flange size (mm)	40 x 6 t Flat
9	Cover Bolt Size	M10/ 3/8 x 1.5" ( Fixed Size)
10	Cover Bolt spacings (Maximum)	75 mm
11	Lifting lugs	2 Nos. 6t mm flat
12	Tank Base Channel (ISMC Type)	2 ( 75 x 40 mm)

**16 KVA Star 1 rating 3 Phase AL wound DT's against TN-1368 is to be mounted on double pole structure therefore base channel arrangement for mounting accordingly as in case of 25 KVA 3 phase Distribution Transformers.**

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

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

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.

**The supplier shall provide additional 8 Nos. stainless steel anti theft fasteners (nuts and bolts) for fixing the base channel on structure.**

**(b) (ii) MEASUREMENT OF SHEET THICKNESS OF TRANSFORMER TANK/ METER & PROTECTION BOX:**

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>
<b>4.</b>	<b>M&amp;P Box.</b>	<b>Both sides and front (average is to be taken)</b>

· 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 as per relevant tender specification is as under for ready reference:

Sr. No.	Rating	Top Cover (mm)	Bottom Cover (mm)	Side of Tank (mm)	M&P BOX ( mm )
1	16 KVA Three Phase	5.0	5.0	3.15	2.0

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:

Weight of 16 KVA Transformer Tank	120 Kg. (approx.)
Variation in thickness of tank	5% (beyond tolerance limit)
Then penalty levied will be	120x80x5 = Rs.480.00 ----- 100

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.

Transformer having thickness even more than 5% after allowing rolling tolerance shall be acceptable.

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 8 mm 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:



- i) 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
- ii) G.I. Nut bolts shall be of size M 10 x 40 mm / 3/8x1.5" long with two flat washers, suitably spaced (as specified) to press the cover.
- iii) Height of the tank shall be such that minimum clear height of 125 mm is achieved between top of yoke and under side of the tank cover (with gasket in place).
- iv) **All the nuts/ bolts / washers – As per latest amended IS:1180 (Part-I):2014.**
- v) 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.
- vi) New cork/ 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. N.	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

- vii) 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.
- viii) 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.**

(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. Inside of tank shall be painted with varnish or oil resistance paint. For external surface, one coat of thermo-setting powder paint or one coat of epoxy primer followed by 2 coat of polyurethane base paint of olive green colour conforming to Shade No. 220 of IS:5-1961 to be applied in order to distinguish of star label transformer. The paint thickness for normal to medium corrosive atmosphere is as per IS:1180 (Part-1/2014).

The requirement for the dry type film thickness (DFT) of paint and the materials to be used shall be as given below.

Sl. No.	Paint Type	Area to be Painted	No. of coats	Total Dry film thickness (min.)
1.	Thermosetting Paint	Inside Outside	01 01	30 microns 60 microns
2.	Liquid Paint			
	a) Epoxy( Primer)	Outside	01	30 microns
	b) Polyurethane base (Finish coat)	Outside	02	25 microns each
	c) Heat resistance paint (Hot oil proof Paint)	Inside	01	35/10 microns

**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 M10x40mm/ 3/8x1.5" 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 HT bushings and it may be ensured that connectors shall be fitted before dispatch.
- e) Oil level gauge of minimum 100 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)	90 °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) One drain cum sampling cum filter valve of Steel 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 as per IS:1180 Part-1 2014
- i) **HV Bushings.** These shall be of 17.5 KV/250 A class, with non adjustable, single gap type arcing horns – (3 Nos.). HT bushing(s) mounting bolt should be tag wedged.
- j) **LV Bushings.** 1.1 KV class, 250A (M12 stem) – (4 Nos.)
- k) Under carriage: For transformers of 16 KVA rating shall conform to REC specifications.
- l) Brass rod 12 mm diameter for HT – (3 Nos.)
- m) Brass rod 12 mm diameter for LT – (4 Nos.)

**Note: LV/ HV Connectors shall not be the integral part of the bushing stems.**

### **19. CONSERVATOR:**

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 10% of total oil in the tank for 16 KVA Distribution Transformer. The inside diameter of the pipe connecting the conservator to a main tank shall be min. of 30 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 200 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. A) H V BUSHING TERMINAL DETAILS :**

3 Nos. **17.5 KV / 250 A** class bushings, conforming to IS:3347 & IS:2099, 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 phases may also be tilted sidewise to maintain the required electrical clearances.

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 inner porcelain portion of bushings shall be projecting approx. 50% of the length inside the conical pocket.

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, CJI, Genesis/ 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).

**Suitable bi-metallic connectors shall be provided , having capacity of about 1.5 times the rated current of the transformer, as per drawing enclosed.**

HT bushing(s) mounting bolt should be tag welded

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

LV Bushing side shall be opposite to the HV Bushing side. 4 Nos. LV Bushings (1.1 KV/ 250 A) shall be mounted on a special pocket 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 M12 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, CJI, Genesis 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/ 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 Losses at 50% loading & at 100% loading.
- 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.

- ix) Type – Oil filled naturally cooled.
- x) IS 1180 part-1/2014.**
- xi) Energy Efficient Level-2**

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

b) **Identification Plate :-** M.S. plate of size 125 x 75 x 2.5 mm having following details punched with letters of size 8mm X 6mm shall be continuously welded to the main tank body below the middle HV bushing and on top cover of tank in clearly visible position :

AJMER DISCOM      TN No. -----  
 ..... KVA ,      S.NO. ....  
 MAKE .....

Further following details is to be punched on all the four sides of the tank preferably in center. The dimensions of letters should be 10x10x1 mm. The punching shall be 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-** M.S. plate of size 125 x 75 x 2.5 mm be affixed on the transformer through continuous welding 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 Height

## **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 **Schedule-V(A)**.

Complete details shall be furnished. Tolerances on weight quantity and dimension figures shall be  $\pm 5\%$  (except for internal configuration) 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% and 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 not older than five years from the date of opening of technical 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
- 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 stage inspection/ 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 losses at 50% & 100 % loading. Remaining testing shall also continue to be carried out as per practice.**
- B) 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 and load losses at rated current and normal frequency.
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. Pressure Test & oil leakage test (As per IS 1180 Part-1:2014)**
11. 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.
12. 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.
13. Oil dielectric strength (break down voltage) test shall be carried out on the transformers opened for physical verification and average value shall be calculated.
14. 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/ AMORPHOUS 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 16 KVA Transformers unit:

- i) Over Flux Density Test (in the first lot and may be repeated in subsequent lots if desired by purchaser).
- ii) Measurement of unbalance current.



- iii) Magnetic Balance Test (See note below)
- iv) 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.

**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 <sup>0</sup> C.	30 <sup>0</sup> C.	40 <sup>0</sup> C.	50 <sup>0</sup> C.	60 <sup>0</sup> C.
11000 Volts (HV)	800	400	200	100	50
433 Volts (LV)	400	200	100	50	25

**PRESSURE TEST: (As per IS: 1180 (Part 1):2014)** -This test shall be conducted as type test at a Govt. approved/ a Govt. recognized/ NABL accredited laboratory. The pressure gauge and vacuum gauge shall be duly calibrated and sealed by an independent recognized test lab(s).

The test procedure shall be as detailed below:

The tank subjected to pressure of 80 KPa for 30 minutes and vacuum of 250 mm of mercury for 30 minutes. There should be no air leakage at any point. The Permanent deflection of flat plate, after pressure has been released, shall not exceed the values given below:

Length of plate up to	Deflection
750 mm	5.0 mm
751 to 1250 mm	6.5 mm
1251 to 1750 mm	8.0 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 ( As per IS 1180 Part-1/2014):**

**The oil leakage test shall be conducted on one unit selected from the offered lot. The assembled transformer for non-sealed and sealed Type with all fittings including bushing in position shall be tested at a pressure equivalent to twice the normal head measured at the base of tank for 8 hrs. There should be no leakage at any point.**

**31. TYPE TESTS:**

The firm shall furnish complete type test reports as per IS:1180 Part-I/2014 of this rating transformer (submitted for BIS Certification) for verification and checking along with drawings to be got approved later on.

**Type tests required – The following Tests shall be conducted on one unit as per IS:1180 Part-I 2014 at NABL/Govt. approved Lab as under:-**

- i) **Short circuit test** for dynamic and thermal ability: The short circuit test for dynamic and thermal ability shall be arranged at a Govt. approved/ a Govt. recognized/ NABL accredited laboratory/ILAC i.e. International Laboratory Accredited Laboratory/ ILAC i.e. International Laboratory Accreditation Cooperation (in case of foreign laboratory) on one unit . 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 total losses at 50% and 100% loading.. 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 or a Govt. approved/ a Govt. recognized/ NABL accredited laboratory/ILAC i.e. International Laboratory Accredited Laboratory/ ILAC i.e. International Laboratory Accreditation Cooperation (in case of foreign laboratory) 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 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 test procedure shall conform to the requirement of Clause 13 of IS: 2026 (Part-III). Impulse voltage withstand test shall be 75 KVp The supply shall be accepted only after arranging successful impulse test on the selected transformer(s).

iii) **TEMPERATURE RISE TEST** : [ As per IS 2026 (Part 2) ]

**Temperature rise test shall be conducted on Maximum measured total loss (No load at rated excitation+Load loss at max. current tap at 75 °C) at 100% loading shall be supplied during temperature rise test** at a Govt. approved/ a Govt. recognized/ NABL accredited laboratory/ILAC i.e. International Laboratory Accredited Laboratory/ ILAC i.e. International Laboratory Accreditation Cooperation (in case of foreign laboratory).

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.

(iv) **PRESSURE TEST: (As per IS: 1180 (Part 1):2014)** -This test shall be conducted as type test at a Govt. approved/ a Govt. recognized/ NABL accredited laboratory. The pressure gauge and vacuum gauge shall be duly calibrated and sealed by an independent recognized test lab(s).

The test procedure shall be as detailed below:

The tank subjected to pressure of 80 KPa for 30 minutes and vacuum of 250 mm of mercury for 30 minutes. There should be no air leakage at any point. The Permanent deflection of flat plate, after pressure has been released, shall not exceed the values given below:

Length of plate up to	Deflection
750 mm	5.0 mm
751 to 1250 mm	6.5 mm
1251 to 1750 mm	8.0 mm

No extra time shall be allowed for arranging these type tests and BIS certification. 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 above type tests shall however not to be insisted on the suppliers who have arranged the above type tests within last 5 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 total Losses at 50% and 100% loading shall form part of tests conducted before and the after the short circuit test and recorded in the report.
- ii) Impulse test as per Clause No.13 of IS: 2026 (Part-III). Impulse voltage shall be 75 KVp minimum
- iii) Temperature Rise Test.
- iv) Air Pressure Test at 80 KPa for 30 minutes and vacuum of 250 mm of mercury for 30 minutes for transformer upto 200 KVA rating and 80 KPa for 30 minutes and vacuum of 500 mm of mercury for 30 minutes for transformer above 200 KVA rating and upto including 2500 KVA rating as per IS:1180 Part-I:2014.
- v) 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, **Temperature rise test and Air pressure 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 total Losses at 50% & 100% loading at rated voltage; No Load current (at 100% and 112.5% of rated voltage); Impedance voltage. 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) If dispatch instructions are less than **10 Nos.** than one sample shall be selected from each store(s) and the test results so obtained shall be for the quantity consigned/ received by store(s).

The percentage impedance voltage at rated current shall not exceed the permissible limit of **4.5% with plus minus 10% tolerance** failing which the sub lot of transformers represented by the sample shall be rejected.

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

**NOTE:**

Further, the size of wire from MCCB to meter & size of lugs be verified from the 01 No. of transformer selected for physical verification out of 100 Nos. or part thereof at CTL. Also, the cross sectional area of the cable by measuring resistance at CTL for each type of make & number of strands of these makes be kept in record and the supplies may be accepted by verifying the number of strands make-wise as the losses of cable are also being measured 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.*

***The tolerance in window height shall be  $\pm 2$  mm, If the window height found beyond  $\pm 2$  mm but up to 7.5 mm then the lot shall be rejected.*** However if the window height is found more than 7.5 mm, from approved/ type tested dimensions, 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 limb centre 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 parameters which are to be tested in CTL are found beyond guaranteed parameters, the lot/ subplot shall stand rejected.*

**NOTE-1. MINIMUM 02 (TWO) NOS. SAMPLES WILL BE TESTED . ONE SAMPLE WILL BE SELECTED FROM FIRST LOT AND ANOTHER SAMPLE WILL BE SELECTED FROM ANY OTHER LOT OF BALANCE SUPPLY SHALL BE TESTED AT CTL, AS UNDER, FOR MINIMUM CLEARANCES SPECIFIED IN SPECIFICATIONS , IN PRESENCE OF FIRM'S REPRESENTATIVE, NO NEGATIVE TOLERANCE SHALL BE ADMISSIBLE .IF CLEARANCES ARE NOT FOUND AS PER THE SPECIFICATIONS THEN THE LOT SHALL BE REJECTED.**

**Following internal clearances should be checked without opening of core coil assembly in each of the transformer which have been selected for physical verification at CTL (i.e. one sample from a lot of 100 nos. or part thereof):**

- a. Between HT outside surface & tank inside (Non-Bushing side).**
- b. Between HT outside surface & tank inside (HV-Bushing side).**
- c. Between HT outside surface & tank inside (LV-Bushing side).**
- d. Between HT winding and Yokes (end insulation).**
- e. From Top of Yoke to inside of top cover of tank(with Gasket).**

**And checking of following clearances will not be insisted for measuring at CTL till sufficient infrastructure, storage and testing facilities are available.**

- a. Between LV winding to Core (Bare Conductor).**
- b. Between LT/HT windings (Radial bare Conductor clearance).**
- c. Phase to Phase clearance between HV limbs.**

**2. THE SAMPLE(S) TESTED IN CTL WILL BE LIFTED DIRECTLY BY THE FIRM FROM CTL AFTER GIVING RECEIPT OF DISTRIBUTION TRANSFORMER RECEIVED AND THIS RECEIPT SHALL BE SENT TO CONCERNED ACOS/CONSIGNEE(S) BY CTL FOR MAKING ENTRY IN THE CONSIGNMEE(S) RECORD. THE SAMPLE WILL BE RE-OFFERED BY THE FIRM.**

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

The other manufacturer who have either participated in the instant tender enquiry can request challenge testing for tests covered in this clause based on specification & losses. The challenger would request for testing with testing fee. The cost of to & fro transportations of all transformer tested under the provision of this clause along with loading & unloading and transit insurance at actual shall be borne by Challenger firm. The challenge testing fees shall be at least three times the cost of testing. The challenger would have the opportunity to select the sample from the store. The party challenged, challenger & the utility could witness the challenge testing. The challenge testing would cover the

- i. Measurement of Magnetizing current**
- ii. No Load Losses test**
- iii. Load Losses test**
- iv. Temperature Rise Test.**

The challenge test could be conducted at any Govt. / NABL accredited Lab. like ERDA /CPRI. If the values are within limits as per specification including tolerance allowed in CTL, the products gets confirm else not confirmed. If the product is not confirmed, the manufacturer will pay the challenge fee and challenger would get the fee refunded. However, as a redressal system, the manufacturer (challenged firm) would be allowed to ask for fresh testing of two more samples from the store and the same be tested in a NABL/Govt. laboratory in presence of party challenged, challenger & the utility. If any one or both sample does not confirm the tests then the product is said to have failed the test. In such cases, the manufacturer (challenged firm) will be declared as unsuccessful

manufacturer for the said product and balance supply shall not be availed and the balance order shall be cancelled with levy of maximum penalty. Firm shall also be debarred for one year or participating against next tender for that rating, whichever is later. The transformers already supplied (including tested in challenge testing) shall be accepted with the following conditions:

- i) Guarantee period of the supplied Transformers shall be increased by double the normal guarantee period.
- ii) Bank guarantee shall be extended to cover the additional guarantee period.

### **33. GUARANTEE PERIOD:**

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

Performance guarantee of the transformer(s) shall be for the period of **36 (Thirty Six)** months from the date of dispatch. The date of expiry of guarantee period shall be marked on the rating plate. Transformer(s) failed within such guarantee period shall have to be repaired / rectified free of cost expeditiously.

**Further, the firm will repair G.P. failed transformers irrespective of breakage of body seals as well as physical damage of transformer tank body due to bursting. The period during which transformer remained defective / failed will not be accounted in the performance guarantee period. The period of defective will be reckoned from the date of first intimation (i.e. field officer / Consignee whichever is earlier) to date of delivery after repair.**

#### **Note:**

- i) **The firm will repair all type of G.P. failed Distribution transformers without asking any segregation on account of manufacturing defect.**
- ii) **However, the Discoms will compensate the cost of missing parts as per practice in vogue.**
- iii) **The guarantee period failed transformers will directly be lifted by the supplier from the respective circle store and after due repair within a period of 120 days (from the date of intimation by the respective consignee) will deposit the same in the ACOS / Central Store, if operative, along with the joint inspection sheet of missing parts issued by the respective consignee. After receiving the material at ACOS / Central Store, the same shall be tested at CTL as per provisions of the relevant contracts and will be issued to the circle store as per requirement of Nigam's account. The invoice of missing parts shall be verified by the ACOS as per the joint inspection sheet issued by the circle store as per practice in vogue and accordingly, the Sr. AO (Cash & CPC) will make the payment of missing parts, if any.**
- iv) **The loading of G.P. failed Distribution Transformers at circle store and unloading at ACOS will be on supplier account.**

**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 :-**

**The Safe Custody Bank Guarantee (SCBG) shall be 1% of the value of the contract or as per following SCBG slabs whichever is lower.**

- i) 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
- ii) In case if order is more than 1000 Nos. but upto 3000 Nos. then the safe custody BG for Rs.10.00 lacs and
- iii) In case 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 JODHPUR DISCOM:**

**In case a central store is created in Jodhpur Discom then all ACOS(s) shall deposit the G.P. failed distribution transformers to Central Store at Jodhpur 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 JdVVNL shall be recovered from you. The separate orders shall be issued by the respective Discoms if central stores are created by them.**

**Ib) For Rajasthan State Firms**

Performance guarantee of the transformer(s) shall be for the period of **36 (Thirty Six)** months from the date of dispatch. The date of expiry of guarantee period shall be marked on the rating plate. Transformer(s) failed within such guarantee period shall have to be repaired / rectified free of cost expeditiously.

**Further, the firm will repair G.P. failed transformers irrespective of breakage of body seals as well as physical damage of transformer tank body due to bursting. The period during which transformer remained defective / failed will not be accounted in the performance guarantee period. The period of defective will be reckoned from the date of first intimation (i.e. field officer / Consignee whichever is earlier) to date of delivery after repair.**

**Note:**

- i) **The firm will repair all type of G.P. failed Distribution transformers without asking any segregation on account of manufacturing defect.**
- ii) **However, the Discoms will compensate the cost of missing parts as per practice in vogue.**
- iii) **The guarantee period failed transformers will directly be lifted by the supplier from the respective circle store and after due repair within a period of 120 days (from the date of intimation by the respective consignee) will deposit the same in the ACOS / Central Store, if operative, along with the joint inspection sheet of missing parts issued by the respective consignee. After receiving the material at ACOS / Central Store, the same shall be tested at CTL as per provisions of the relevant contracts and will be issued to the circle store as per requirement of Nigam's account. The invoice of missing parts shall be verified by the ACOS as per the joint inspection sheet issued by the circle store as per practice in vogue and accordingly, the Sr. AO (Cash & CPC) will make the payment of missing parts, if any.**
- iv) **The loading of G.P. failed Distribution Transformers at circle store and unloading at ACOS will be on supplier account.**

**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: -**

**The Safe Custody Bank Guarantee (SCBG) shall be 1% of the value of the contract or as per following SCBG slabs whichever is lower.**

- i) 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
- ii) In case if order is more than 1000 Nos. but upto 3000 Nos. then the safe custody BG for Rs.10.00 lacs and
- iii) In case 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 JODHPUR DISCOM:**

**In case a central store is created in Jodhpur Discom then all ACOS(s) shall deposit the G.P. failed distribution transformers to Central Store at Jodhpur 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 JdVVNL shall be recovered from you. The separate orders shall be issued by the respective Discoms if central stores are 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 **36 (Thirty Six)** 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

<u>Ist time</u>	<u>IInd time</u>	<u>IIIrd time</u>
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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 color 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 colored 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 revetting.

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 transformers may be got tested at CTL as per the sampling plan of new transformer except the physical opening test. The 10% tolerance (as per IS:2026 Part-I/1977) be allowed on total losses at 50% and 100% loading for the transformers failed under guarantee period for testing at firms' works as well as in CTL testing.**

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:-

1. Firm shall keep the records for at least 8 years of transformers supplied by them.

**2. As per GCC, the lifting of G.P. failed transformers and delivery after repair is the responsibility of the firm, therefore, loading and unloading charges may be borne by the supplier as decided by Nigam/CLRC rate time to time. The Central Store(ACOS JCC) / respective circle stores (as the case may be) will intimate these charges directly to the Sr. A.O. (CPC & Cash), JdVVNL, Jodhpur under intimation to firm every month / year .**

### **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, freight & insurance charges & GST Tax for delivery at our stores. The quoted prices shall be variable as per IEEMA price variation formula attached herewith at **Schedule-II**, without any ceiling for distribution transformers The **base date for price variation shall be 01.09.2017.**

However, the prices of LV Cover cum Meter & Protection Box unit are **FIRM**. The prices shall be quoted after considering benefit of GST 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 along with receipted challans to the Sr. Accounts Officer (CPC & Cash), JdVVNL, Jodhpur.

### **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 and BIS certification 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.

### **36 (I) Attachment Details For Tamper Proof "Metering cum Protection (M&P)Unit having provision of Single meter :**

Tamper Proof Metering & Protection unit shall be manufactured in accordance with the following Standards.

- (a) The Enclosure Box shall comply with the requirement of I.S. 13947/I/1993 for Degree of Protection I.P.- 33.
- (b) TP MCCB shall be in accordance with I.S. 13947/II/1993 amended up to date.
- (c) The MCCB will be provided by Suppliers.

**The drawing and bill of material is enclosed at Annexure-A are applicable for all the three Discoms.**

### **36 (II) Attachment Details For Tamper Proof "Metering cum Protection (M&P)Unit having provision of Two meter :**

Tamper Proof Metering & Protection unit shall be manufactured in accordance with the following Standards.

- (d) The Enclosure Box shall comply with the requirement of I.S. 13947/I/1993 for Degree of Protection I.P.- 33.
- (e) TP MCCB shall be in accordance with I.S. 13947/II/1993 amended up to date.
- (f) The MCCB will be provided by Suppliers.

**The drawing and bill of material is enclosed at Annexure-A-2 are applicable for all the three Discoms.**

**General Technical Particulars :**

These outdoor type cabinets are to be manufactured and supplied as complete unit suitable for fixing **1 Nos. and 2 Nos.** 3 phase 4 wire whole current energy meter and modem (Meters and Modem are not in the scope of supply of bidder), alongwith 1 No. TPMCCB, Terminal Blocks and wiring in sheet steel cabinet duly powder coated/ enamel painted as per clause no 17 (f) of specifications.

**Cabinet :**

**The Enclosure shall be fabricated by using CRCA sheet steel of not less than 14 SWG / 2 mm thickness with the size of 540 x 550 x 200 mm (WxHxD) for single meter & 790x665x200mm (WxHxD) for two meter box & shall comply with the requirement of I.P. – 33 as per I.S. 13947/I/1993.**

1<sup>st</sup> Chamber : For Transformer's L.V. Bushings, 01 No. TP MCCB/As per drawing.

2<sup>nd</sup> Chamber: For Meter (Meter is not in the scope of supply of Bidder) and a space of 100 x 150 mm to accommodate one unit on modem (modem is not in the scope of supply of bidder). As per enclosed drawing at **Annexure-C**.

3<sup>rd</sup> Chamber: For TP MCCB as per Annexure A-2 (for two meter).

4<sup>th</sup> Chamber: Same as component 2<sup>nd</sup> (for two meter).

**1<sup>st</sup> Chamber :-**

As shown in the drawing, this shall be in the right angle shape of size 150 mm wide to provide on the Top of the enclosure for L.V. transformer bushings and inside for mounting 01 No. **30 Amp. rating** triple pole MCCB. The required minimum electrical clearances as specified in clause no. 12 (A) of specification shall be maintained while providing / fixing the box.

**2<sup>nd</sup> Chamber :-**

The chamber of size 398 x 195 mm with 2 mm thick shall be designed as per drawing to be provided with Meter fixing arrangement such that front & back as well as up & down with tilting adjustment can be done to accommodate various type & make of Meter(s) and L.T. Bushing for releasing connections to consumer and space of 100 x 150 mm for providing one unit of modem as shown in drawing.

**A. Main features of the 'metering cum protection box' are as under:**

The box shall be as per drawing attached at **Annexure-C**.

- I. The single door sliding cover shall be provided with **15 mm** thick triplex glass window of size 150 mm x 115 mm –1 No. for Metering Chamber to facilitate meter reading for each meter.
- II. One M10 x 25 mm Bolt with Washer Isolated Earth Terminal with bushing shall be provided for body earthing.
- III. 04 Nos. LT Bushing 1.1 kv / 250 Amp. as per IS:3347 brass shall be provided at right side of box to connect service line of consumer as shown in the drawing.
- IV. Louvers to be provided on both sides of cabinet / enclosure.
- V. 3 Nos. Earth sticker with Earth Symbol to be provided.
- VI. Danger Plate 125x35 mm with Hindi Language with "440V AC".
- VII. All connecting wire ends should be fitted with proper lugs and properly connected except meter terminals as detailed in drawings.
- VIII. Single Panel Sliding Door to cover meter chamber for each meter.
- IX. MCCB operating rod to be supplied with transformer.
- X. A Bakelite Sheet of size 300x200x6 mm has been provided for proper fixing of the meter for each meter.
- XI. Following size of lugs shall be provided for 16 KVA distribution transformers as under (for each meter/as required):  
Lugs for LT Terminal as per Catalogue No. 7033 / 1.20 mm – 08 Nos.  
Lugs for MCCB as per Catalogue No. 7030 / 1.20 mm – 06 Nos.  
Terminal ends for meter – CP - / 5.5 x 1.2 mm - 08 Nos.
- XII. Copy of invoices and test certificates of MCCB verified from the original(s) available with the firm is to be enclosed with the inspection report alongwith a copy of authorization letter of manufacturer to the dealer.
- XIII. All the connections except LED should be through PVC covered copper flexible cable of 16 mm sq. and for LED connections 2.5 mm sq. cable shall be used.**
- XIV. The sliding cover shall be attached with the main body of M&P Box with the help of 02 Nos. nuts bolts each side of sliding cover (total 08 Nos. nuts bolts) as shown in the drawings.**
- XV. 03 Nos. bolts in the holes of the upper portion of the back side sliding cover should be put up in such a way that the cover should not be fall down and head of the bolts should also be welded.**
- XVI. 02 Nos. (01 no. on each corner) Stainless Steel Anti-theft fastener should be provided at the bottom to fix the sliding cover with the M & P Box.**
- XVII. The M & P box is firmly fixed with the transformer tank by providing all the nuts and bolts (total 10 nos.) as per specification.**
- XVIII. The stainless steel anti- theft nuts is provided on all four corner bolts of box and remaining nuts should be tack welded with the bolts.**
- XIX. Hexagonal head of all the anti-theft nuts should be removed/detached so that the purpose of use of anti-theft nut and bolt be fulfilled.**
- XX. It should be ensured that there should be continuous welding on the complete m & P box on all sides.**
- XXI. M&P Box should be properly fixed with LT side flange of transformer by using min. 3 mm thick gasket so that water should not be go inside of M&P Box.**

**(The above points appearing at Sr. No. XIV to XXI will be checked in CTL)**

XXII. Length of Cable to be provided for connections in M&P Box shall be as under:

- I) **MCCB to Meter:**  
 Red (R) – 400 mm  
 Yellow (Y) – 400 mm  
 Blue (B) – 450 mm
- II) **From Meter to LT Distribution Terminal:**  
 Red (R) – 600 mm  
 Yellow (Y) – 500 mm  
 Blue (B) – 400 mm

**NOTE:**

- a. All dimensions are in MM.
- b. Sheet steel thickness: 2.0 mm (min)
- c. Paint shade: Exterior & Interior – olive green colour conforming to Shade No. 220 of IS –5 of 1961
- d. Degree of enclosure protection IP:33

**36.2 Specification of MCCB :**

The following makes of MCCB shall be acceptable :- Seimens / L & T / ABB / GE Power / Schneider – France / SPACEAGE \_Hyundai/ HAVELS/ C&S /HPL/Andeli only. The MCCB shall directly be purchased from the manufacturer or the authorized dealer or stockist, however in every case of purchase of MCCB the delivery shall be from the manufacturer's godown for which a copy of bill shall be given to inspecting officer at the time of stage inspection.

Three pole MCCB is to be provided on LV side with over load trip release with inverse time current characteristics for overload protection and magnetic trip release for instantaneous tripping in the wake of Short-Circuits.

These MCCB's shall be confirming to I.S. 13947/1993 as amended upto date. The rated un-interrupted current of MCCB shall be 100 Amp. with the overload release set at 30 Amp. for 16 KVA Distt Transformers. The type test certificate(s) as per the relevant standards of the MCCB's meeting the below mentioned tripping characteristics shall also be furnished along with the tender.

The MCCB's shall be manually independent & shall have quick make, quick break Mechanism, the detailed specification of MCCB shall be as under:

Application	Outdoor (enclosed).
Utilization category	'A' (IS: 13947/1993) as amended upto date.
Type	Thermal-Magnetic trip free mechanism.
Number of poles	Three.
Reference ambient temperature	40 °C.
Rated insulation level	600 V.
Rated operational voltage	415 V.
Continuous current rating	100 A
Fixed overload release setting (Amp)	<b>30 Amp. for16 KVA</b>
Ultimate Short Circuit Breaking capacity (ICU)	18 KA at 0.3 P.F. at 240 V AC.

Rated service Short Circuit Breaking capacity (ICS)	18 KA at 0.3 P.F. at 240 V AC.
Power factor for Short Circuit (max.)	0.3 (lag.)
Application Standard	IS 13947 Part-2 (latest) - 1993
Time current characteristics	To co-ordinate with HV fuse.

The MCCB shall not cause any nuisance tripping due to switching current of motor & capacitor loads, and shall have the following time-current characteristics:

<b>Multiple of normal current setting</b>	<b>Tripping time</b>
1.05	More than 2.5 HRS.
1.1	Less than 2.5 Hrs.
1.15	More than 1 Hr. & less than 2 Hrs.
1.2	More than 0.5 Hrs. & less than 1 Hr.
1.3	Less than 20 minutes.
1.4	Less than 10 minutes.
2.5	Less than 1 minute.
6.0	Less than 5 seconds.
8.0	Less than 40 milli seconds.
12.0	Instantaneous(less than 20 milli Seconds.)

For above time / current characteristics reference calibration temperature of the breaker shall be 50 degree C. Deration if any up to 60 degree C ambient temperature shall not exceed 10% of the current setting indicated above.

The Bidder shall submit the type test reports as per I.S. 13947/1993/IS1180 Part-I 2014 for test sequence I,II & III complete with certified drawings, Oscillograms and approved drawing from NABL approved laboratory alongwith the offer.

The MCCB's shall be marked with 'Brand Name' of manufacture and Ics in KA by embossing only whereas other particulars may be marked as per the manufacturers standard practice.

The contacts of MCCB should be self-wiping type so as to keep the contacts clean and milli-volt drop low. The MCCB shall be provided with push to trip facility.

#### **Acceptance Tests:**

The following tests shall be carried out by purchaser's representative on MCCB's on the sample numbers equivalent to the number of transformers samples.

1. Overall Dimensional Checking.
2. High Voltage test at 3 kV for one minute.
3. Insulation resistance test.

#### **Instruction and operation Manual**

The successful bidder shall be required to submit 5 copies of Instruction and Operation manual for each lot of 100 Transformers (or part thereof) supplied. This

instruction manual should give complete details about the pre-commissioning tests/checks and the details of preventive maintenance etc.

### **36.3 Signal Light (LED Indicating Lamp):**

The MCCB enclosure shall be provided with LED indicating lamp to indicate tripping of MCCB. An auxiliary relay with changeover contacts can be used to connect LED indicating lamp to the transformer secondary terminals if MCCB is not having auxiliary contacts. In case the MCCB trips or switched OFF, the relay contacts are closed which turns ON the LED indicating lamp. When the MCCB is reset and switched ON, the indicating lamp switches OFF. Signal light shall be arranged to avoid damages while handling the MCCB enclosure at site.

### **37. 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 amounting to 0.25% of the BG value or Rs. 25,000/-, whichever is less (it will also applicable on other type of Bank Guarantee(s)). Out side the state of Rajasthan firms not furnishing the bank guarantee on non-judicial stamp paper of Rajasthan Govt. and less than as prescribed by the Raj. Govt., then they shall have to furnish difference amount of stamp duty on NJS of Raj. Govt. You shall also furnish manufacturer's warranty on non-judicial stamp paper of appropriate value 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.



**The benefit of composite Bank guarantee be given only before submitting PBG/PBG amount deducted by Sr AO(CPC).If once firm submit PBG or amount deducted by Sr AO(CPC) , the amount of PBG will not be released till performance period over and request for CBG will not be entertained during currency of contract.**

**38. QUANTITY:**

Sr. No.	Item/ Rating	Quantity in Nos.
1.	<p><b>16 KVA, 11/0.433 KV, Outdoor Type, Energy Efficiency Level-2 (Star 1 Rating) Aluminium Wound (CRGO /Amorphous Core) Distribution Transformers With LV Bushing cover Cum Metering &amp; Protection Box Having Provision of Metering on LV Side.</b></p> <p>The prices of Transformer component shall be variable as per IEEMA Price Variation Formula without any ceiling &amp; FIRM towards LV Bushing cover cum Metering &amp; Protection Unit.</p>	8,971 Nos

**NOTE:-**

- A) Price bids shall be opened only of the firms who are having “BIS Certificate” as on opening of technical bid.
- B) Besides above changes, the technical parameters of the specifications wherever are deviating from the IS:1180 (Part-I/2014), the same shall be in accordance with IS:1180 (Part-I/2014) and its latest amendments, if any and the changes where the IS:1180 (Part-I/2014) is silent for technical parameters, same shall be applicable as per Discom specification.

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

**16 KVA, 11/0.433 KV, OUTDOOR TYPE, ENERGY EFFICIENCY LEVEL-2 (STAR 1 RATING) ALUMINIUM WOUND (CRGO /AMORPHOUS CORE) DISTRIBUTION TRANSFORMERS WITH LV BUSHING COVER CUM METERING & PROTECTION BOX HAVING PROVISION OF METERING ON LV SIDE UNDER SPECIFICATION NO. JDVVNL/SE (MM&C)/EIAI/ TN-1368.**

S.No	ITEM	QUANTITY
1.	<b>16 KVA, 11/0.433 KV, Outdoor Type, Energy Efficiency Level-2 (Star 1 Rating) Aluminium Wound (CRGO /Amorphous Core) Distribution Transformers With LV Bushing cover Cum Metering &amp; Protection Box Having Provision of Metering on LV Side.</b>	<b>8,971 Nos</b>

**NOTE:-**

- A) Price bids shall be opened only of the firms who are having “BIS Certificate” as on opening of technical bid.**
- B) The quantities as mentioned in the schedule of requirements are tentative and may increase/decrease as per the requirement of the Nigam.**
- C) Besides above changes, the technical parameters of the specifications wherever are deviating from the IS:1180 (Part-I/2014), the same shall be in accordance with IS:1180 (Part-I/2014) and its latest amendments, if any and the changes where the IS:1180 (Part-I/2014) is silent for technical parameters, same shall be applicable as per Discom specification.**

**SCHEDULE- II**

PRICE VARIATION CLAUSE FOR ALUMINIM WOUND DISTRIBUTION TRANSFORMERS  
COMPLETE WITH ALL ACCESSORIES AND COMPONENTS  
(FOR SINGLE AND THREE PHASE OF RATINGS UPTO 2500 KVA AND VOLTAGE UPTO 33 KV)  
(BEE / ENERGY EFFICIENCY LEVEL AS PER IS: 1180(PART-I): 2014)  
Supplied against domestic contracts UNDER **TN-1368**

**This price variation clause is applicable for ‘Single Phase & Three Phase Aluminum Wound Distribution Transformer’ for BEE / Energy Efficiency Level as per IS:1180 (Part-I):2014 of rating upto 2500 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.

$$P = \frac{P_o}{100} \left\{ 10 + 19 \frac{AL}{ALO} + 30 \frac{ES}{ESo} + 13 \frac{IS}{ISo} + 4 \frac{IM}{IMo} + 11 \frac{TO}{TOo} + 13 \frac{W}{Wo} \right\}$$

Wherein

- P** = Price payable as adjusted in accordance with the above formula.  
**Po** = Price quoted/ confirmed.  
**ALO** = 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.  
**ESO** = 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.  
**ISO** = **Price of HR coil of 3.15 mm thickness** (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.  
**IMO** = 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.  
**TOO** = 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.  
**WO** = 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 December, 2015, applicable price of Aluminium (ALo) and Transformer Oil (TOO) CRGO Steel Sheets (ES0), HR Coil (IS0) and insulating material (IMO) should be as on 1<sup>st</sup> November, 2015 and all India average consumer price Index number (W0) should be for the month of September, 2015.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA (PVC) / DIST\_PWR\_TRF/-/- 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** = **Price of HR coil of 3.15 mm thickness** (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.
- 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. 2015, the applicable price of aluminium (AL) and Transformer Oil (TO), CRGO steel sheets (ES), HR coil (IS) and insulating material (IM) should be as on 1<sup>st</sup> Nov. 2015 and all India average consumer price index number (W) should be for the month of Sept. 2015.

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

The claim of price variation shall be governed as per the Clause No. 1.10.2 of Instructions to Bidders.

**NOTE- The Base date will be 01.09.2017 irrespective of date of tender opening.**

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

- a) The prices quoted shall be variable as per Price Variation Formula given in the Specification (Schedule-II) without any ceiling.
- b) If the price variation formula/indices 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 Jodhpur 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****JODHPUR 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 confirm	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 confirm	Other particulars if any.	to
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**(Signature)**

Name & Designation  
with seal of the bidder.

**SCHEDULE-III-A****QUALIFICATION REQUIREMENT FOR 16 KVA THREE PHASE ALUMINIUM WOUND ENERGY EFFICIENT LEVEL-2 (STAR-1 RATING ) DISTRIBUTION TRANSFORMERS ALONGWITH LV COVER CUM METER & PROTECTION BOX UNITS (TN-1368)**

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 **Licensed Power Utility / Discoms / Govt. Departments** Distribution Transformer at least 2XQQ (QQ being the quoted quantity) of **block of 10, 16, 25, 40, 63 & 100 KVA and higher rating Three Phase Transformer** ; for tender of three phase transformer of any rating upto 100KVA **shall be considered together for Qualifying Criteria**, in last three financial years from the date of opening of techno commercial bid (For quantity verification C.A. Certificate should be furnished in prescribed proforma as per schedule-VII(A) only). 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.

**Note: The material supplied and accepted for same/ higher rating for Turnkey projects to a licensed power utility/Govt. shall be considered (as above applicable blocks) for the purpose of evaluating criteria. The certificate given by C.A. shall indicate above quantity separately.**

**In support of fulfilment of past supply criteria, the bidder shall furnish documentary evidence in the form of certificate from Chartered Accountant in the enclosed prescribed proforma only. This prescribed proforma should be furnished either in original or copy duly attested by notary. The bidder shall also sign and affix seal on the CA certificate. The certificate should have membership number with the name and address of the chartered accountant. Certificate should clearly indicate the quantity supplied , period of supply, voltage class, rating of Transformer etc. In the format prescribed, any deviation to the format or information diverted format will not be considered and rejected.**

**The bidder is also advised to furnish an undertaking regarding correctness of CA certificate in enclosed ANNEXURE-I.**

IV) The BIS is must for participation in the bid along with the type test reports of offered type and design which should not be older than five years as on date of opening of technical bid. The type test should be conducted on one unit i.e. Short Circuit Withstand Test, Lightning Impulse Voltage Withstand Test, Temperature Rise Test and Pressure Test as per IS:1180 (Part-I)/2014 .The firm will furnish Type Test SBG of Rs.5.0 lac in lieu of non furnishing of Type Tests Reports of offered type & design .The firm will also furnish the valid BEE Certificate (16 KVA 3-phase to 160 KVA 3-phase DT) and inclusion of offered rating in the BIS Certificate before commencement of supply.

**Note: The price bid of only those bidders shall be opened whose BIS Certificate is valid as on the date of opening of Technical Bid.**

V) The bidder shall furnish valid type test certificates of same rating of offered item from a Govt. approved / Govt. recognized / NABL Accredited laboratory / ILAC i.e. International Laboratory Accredited Laboratory (in case of foreign laboratory). **The date of conducting type test shall be before the date of opening of technical bid and** such type test certificates should not be older than 5 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. The following Type Test shall be conducted on one unit at NABL/Govt. Approved Lab as per IS:1180 part-1/2014 (Details of Test given in the specification)

- a) Lightning Imp. Voltage Test at Min 75 KVp
- b) Short Circuit Test
- c) Temperature Rise Test
- d) Pressure Test.

VI) **In case the bidder is not in a position to furnish type test certificate of same rating of offered item and furnish type test certificate of higher rating from CPRI / independent NABL Accredited laboratory/ Govt. approved lab (which does not belong to tenderer) at the time of submission of bid, the bid of the bidders may be considered as responsive, if bidder gives an undertaking along with BG / DD / Pay Order that type test of rating offered shall be arranged from first lot (without asking for any delivery extension) from CPRI / independent NABL accredited lab.**

**The date of issuing of the Type Test Bank Guarantee in lieu of non-furnishing of Type Test reports shall be before the date of opening of technical bid & the Type Test BG issued on or after opening of technical bid shall not be accepted. The bank guarantee from a Scheduled Bank / DD / Pay Order should be for an amount of Rs.5.0 Lacs towards furnishing of satisfactory type test reports before commencement of scheduled delivery. In case the bidder fails to furnish successful type test certificates from the offered lot(s), their bank guarantee / DD/ Pay Order will be invoked / forfeited (Performa for submitting undertaking a bank guarantee is enclosed at Schedule-III C). The initial validity of B.G. shall be nine months.**

The firms may furnish the Type Test Reports of offered type & design or of higher rating with a Bank Guarantee of Rs.5.0 lac along with the Technical Bid. The date of issuing of the Type Test Bank Guarantee in lieu of non-furnishing of Type Test reports shall be before the date of opening of technical bid & the Type Test BG issued on or after opening of technical bid shall not be accepted.

**Note:-New state units & also those units located in Raj. which do not meet Qualifying Criteria may be considered for trial order subject to technical competency and furnishing of BG of Rs. 5.00 Lacs in lieu of non furnishing of Type test report of offered items and design but BIS Certificate must be valid as on date of opening of Technical Bid failing which the bid shall be considered Non-Responsive.**

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



- XI) 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.
- XII) The type test certificates shall be furnished either in original or copy duly attested by notary. **The date of conducting type test shall be before the date of opening of technical bid**

**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.

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

The bidder who have been black listed **in any of the state Discom** or with whom business relations have been severed in Jodhpur 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:**

**(A) Black Listing of Firms-**

After having given Show Cause Notice of 30 days, and having established & cogent reasons for blacklisting of the firm as given below, the firm should immediately be blacklisted for a period of 5 years indicating reasons of doing so, in the letter itself, and a copy of such blacklisting should be given to the firm, with the approval of CLPC:-

(i) There are sufficient and strong reasons to believe that the supplier or his employee has been guilty of malpractices such as manhandling/misbehaviour with Government official by supplier or his partner/employee, bribery, corruption or abatement of such a offence in a position where he could corrupt Nigam's official, fraud, vitiating fair tender process including substitution of or interpolation in tender, mis-representation, pilfer-aging or unauthorized use or disposal of Nigam's material issued for specific work etc.

(ii) 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 dealing or where security considerations including suspected disloyalty to the Nigam/state so warrant the blacklisting.

(iii) If the State Bureau of Investigation or any other authorized investigating agency recommends for blacklisting after completing the investigation.

**Note: - 1**

If a supplier after having tendered for a supply or after negotiations gives application voluntarily vitiating the fair tendering process, it shall also tantamount to malpractice.

**Note: - 2**

A Black listed supplier –

- (i) shall not be entitled for registration in any of the Discom
- (ii) shall not be awarded any supply order in future in any Discom during the notified period.
- (iii) his registration if any shall stand cancelled immediately and his registration security /EMD/S.D. shall stand forfeited.
- (iv) In case of blacklisting of the firm by any one of Discom for the cogent prescribed reason(s) as stipulated above, the same shall be applicable to all the three Discoms and as a consequence of blacklisting, all the pending orders to that firm, will be cancelled in all three (3) Discoms with immediate effect. However in respect of completed/executed contract G.P. obligations as well as other liabilities shall be fulfilled by the supplier.

**1. Severement of Business relation:**

After having given Show Cause Notice of 30 days, and having established & cogent reasons for Severement of business relation as given below, the firm should immediately be severed the business relations for a period of 2 to 3 years indicating reasons of doing so, in the letter itself, and a copy of such severement should be given to the firm, with the approval of CLPC:-

- (i) The supplier continuously refuses to pay Nigam dues without showing adequate reasons and where the purchasing authority is satisfied that no reasonable dispute attracting reference to Settlement Committee or Court of Law exists for the supplier's action of non-supply.
- ii. When vendor does not accept LOI/detailed purchase order awarded on its accepted prices and terms & conditions or does not comply with the contractual formalities.
- iii. When vendor/supplier who otherwise completed contractual formalities but does not commence supplies on the date of opening of technical bid of the fresh tender/completion of schedule delivery period whichever is later.

**Note:-**

- 1. In case supplier does not deposit outstanding dues towards Nigam, even after completion of severement period, the period of severement will continue.
- 2. Severement done purely/ mainly on account of non-deposition of dues against the supplier/vendor/contractor could be lifted by CLPC, if the dues are deposited prior to the expiry of such severement period.
- 3. Severement done by one Discom for non-supply of material and /or corresponding non-recovery of dues will not be effective in other Discoms **except in respect of common purchase cases of Three Discom.**
- 4. On severement of business, the EMD/SD/vendor registration security will be forfeited.

5. The orders in execution satisfactorily will not be cancelled other than the order on which severement have been done.

**(B) DEBARMENT:-**

Reasons on which Debarment can be made:-

- (i) The competent authority may debar the supplier on account of his performance or other disabilities, if it is no longer considered fit to remain under vendor registration as per his obligation under vendor registration.
- (ii) If at any subsequent stage of inspection of firms after award of contract, it is found that firm does not have sufficient tech. staff or required/necessary technical equipment, the purchasing authority can debar the firm for one year or next tenders whichever is later. The debarment will be lifted only on re-inspection of firm's works; the defects noticed earlier are fully rectified to the satisfaction of Nigam.
- (iii) When contract agreement executed and supplies commenced but could supply only up to 50% of ordered quantity and scheduled delivery period expired, then the firm can be debarred for one year or next tender whichever is later in that Discom only for that particular item/rating/ capacity/size etc.
- (iv) The suppliers who have been awarded contract for supply of material is not adhering to the periodic delivery schedule, the contract awarding authority reserve the right to terminate the contract and may debar the firm in participating in tender for a period of 2 to 3 years.

**Note:-1.** On debarment, the EMD/ SD/Vendor Registration security shall be forfeited.

**Note:-2.** If the firm is debarred in one Discom for any reasons then the same should not be applicable in other Discom **subject to exception that in case of common Discoms purchases such debarment of a firm would be applicable to all three Discoms for that particular item and rating/capacity/size etc.**

**XII) APPEALS AND APPLICATIONS:**

Appeal against the order of blacklisting, severement and debarment can be filed before BOD within a period of 3 months from the date of intimation. The letter of appeal will be addressed to the order placing authority. Who will process the case for placing the matter in B.O.D. with in a period 60 days. The BOD may reduce or waive the penalty, if sufficient reasons/supporting documents are furnished by the supplier.

**Schedule – III -B**

**BANK GUARANTEE IN LIEU OF FURNISHING OF TYPE TEST CERTIFICATE**

**(On Rajasthan Non-Judicial Stamp Paper worth Rs. 0.25% of BG Value)**

To,

The Superintending Engineer (MM)  
Jodhpur Vidyut Vitran Nigam Limited  
New Power House Premises,  
Industrial Area,  
Jodhpur.

Dear Sir,

Whereas Jodhpur Vidyut Vitran Nigam Limited, Jodhpur (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 Superintending Engineer (MM), Jodhpur Vidyut Vitran Nigam Limited, Jodhpur 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 Superintending Engineer (MM), Jodhpur Vidyut Vitran Nigam Limited, Jodhpur shall be final.

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

The undertaking will be determined on but will not withstanding 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 JODHPUR in Rajasthan.

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

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.

**SCHEDULE-IV `A`****JODHPUR VIDYUT VITRAN NIGAM LIMITED  
A Govt. of Rajasthan Undertaking****Must be filled-in by the tenderer and attach with technical bid (Part-I)**

To,

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

Dear Sir,

With reference to your invitation to tender against specification No. **JdVVNL/SE (MM&C)/EIAI/TN-1368.....**, 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 "BEE" certificate & Type Test Certificates
1	2	3	4	5	6

1.	The offer is valid for a period of 120 days from the next date of opening of this tender.
2.	<b>The base date of prices will be 01.09.2017 (as per IEEMA latest circular) irrespective of date of tender opening</b>
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 <b>Schedule-VIII</b> 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. <b>JdVVNL/SE (MM&amp;C)/EIAI/TN-1368</b> 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. <b>JdVVNL/SE (MM&amp;C)/EIAI/TN-1368</b> and there are no deviations other than as specified in the <b>Schedule VI (A&amp;B)</b> .

Yours faithfully,

Signature of tenderer  
with stamp Dated

**SCHEDULE - V**

**JODHPUR 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

**16 KVA (AL) WOUND, 11 / 0.433 KV ENERGY EFFICIENT LEVEL-2 (STAR-1 RATING)  
DISTRIBUTION TRANSFORMER ALONGWITH LV COVER CUM METER & PROTECTION  
BOX UNIT AGAINST TN-1368**

S. No.	P A R T I C U L A R S	AS OFFERED
		16 KVA
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>Full Load losses (watts) at 75 ° C</b>	
15.	<b>Total losses (watts) at 75 ° C</b> <b>(a) At 50% loading</b>	
	<b>(b) At 100% loading</b>	
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.	PARTICULARS	AS OFFERED
		16 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.	<b>H V Bushing details:-</b> (a) Rating of the bushing (b) Impulse strength (c) Power frequency withstand voltage, dry and wet (d) IS reference	
27.	<b>LV Bushing details :-</b> (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 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	

S. No.	P A R T I C U L A R S	AS OFFERED
		16 KVA
	(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.	<b>Minimum external clearances in air (with B M C s mounted)</b> (a) HV phase to phase (b) HV phase to earth (c) LV phase to phase (d) LV phase to earth	
32.	<b>Minimum internal clearances (in oil)</b> (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 (including 1 mm ring of press board) (j) Maximum clearance of core channels from tank walls at each end	
33.	<b>Tank details :-</b> (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.	<b>Cooling radiator details :</b> (a) Cooling tube size (b) Total length of tubes used (c) Whether cooling calculations attached? (d) No. of tubes on each side	
35.	Size of core frame channels	
36.	<b>Core details</b>	

<b>S. No.</b>	<b>PARTICULARS</b>	<b>AS OFFERED</b>
		<b>16 KVA</b>
(i)	Tie rod details	
(ii)	Size of core frame channels	
(iii)	Core diameter (mm)	
(iv)	Core stud details	
(v)	Core coil assembly base supports ( 2 Nos )	
(vi)	Window Height (mm)	
(vii)	Limb Center (mm)	
38.	<b>Transformer weight details:</b> (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)	
39.	<b>Overall dimensions</b> (a) Length (b) Breadth (C )Height	
40.	<b>Whether the bidder is an ISO: 9001 / 9002 certified company?</b>	

**(Signature)**

Name &amp; Designation with seal of the bidder



**Schedule – VI (A)**

**JODHPUR 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)**



**JODHPUR 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****JODHPUR 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
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-1368****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 during the financial year		Remarks
						Quantity	Value (Rs)	Quantity	Value (Rs)	
1	2	3	4	5	6	7	8	9	10	11
1	2014-15									
2	2015-16									
3	2016-17									

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 CA Certificate should be furnished on the letter head of CA and 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****JODHPUR VIDYUT VITRAN NIGAM LIMITED****DELIVERY SCHEDULE AGAINST TN-1368****PART-A**

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

<b>Sr. No.</b>	<b>Particulars of Material</b>	<b>Commencement period</b>	<b>Rate of supply per month of delivery of entire material</b>	<b>Period for completion of delivery material</b>
1.	<b>16 KVA</b> THREE PHASE ALUMINIUM WOUND ENERGY EFFICIENT LEVEL-2 (STAR-1 RATING ) DISTRIBUTION TRANSFORMER ALONGWITH LV COVER CUM METER & PROTECTION BOX UNIT	45 days	_____ Nos. per month (to be quoted by tenderer)	Eight and half months excluding commencement period (Max.)

**PART-B**

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

<b>Sr. No.</b>	<b>Particulars of Material</b>	<b>Commencement period</b>	<b>Rate of supply per month of delivery of entire material</b>	<b>Period for completion of delivery material</b>
1.	<b>16 KVA</b> THREE PHASE ALUMINIUM WOUND ENERGY EFFICIENT LEVEL-2 (STAR-1 RATING ) DISTRIBUTION TRANSFORMER ALONGWITH LV COVER CUM METER & PROTECTION BOX UNIT			

**NOTE:**

- (i) **The offers deviating in deliveries mentioned above at part 'A' shall be considered as non responsive** in accordance to Clause No. 35 of the technical specification Section - III. **In case if ordered quantity is different than quoted quantity then monthly deliveries shall be adjusted proportionately.**
- (ii) During the commencement period the contractual formalities shall be got completed.

Signature

Name & Designation  
With seal of the tenderer



**Schedule – IX****JODHPUR 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 along with 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 along with 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**

**JODHPUR VIDYUT VITARAN NIGAM LIMITED**  
**MATERIAL MANAGEMENT CIRCLE**  
**NEW POWER HOUSE, INDUSTRIAL AREA, JODHPUR-342003**  
**Phone: (0291)2742223/Fax: (0291) 2746539/E-Mail-semmcjdvvn@gmail.com**

**SPECIFICATION FOR 16 KVA, 11/0.433 KV, OUTDOOR TYPE, ENERGY EFFICIENCY LEVEL-2 (STAR 1 RATING) ALUMINIUM WOUND (CRGO /AMORPHOUS CORE) DISTRIBUTION TRANSFORMERS WITH LV BUSHING COVER CUM METERING & PROTECTION BOX HAVING PROVISION OF METERING ON LV SIDE UNDER SPECIFICATION NO.JdVVNL/SE/MM/ EIAI /TN-1368.**

<b>A</b>	<b>SHORT TERM NIT No.</b>	<b>TN-1368</b>
<b>B</b>	Cost of tender specifications	<b>Rs. 2500.00 + GST@18% = Rs. 2,950.00 (Rs. Two Thousand Nine Hundred &amp; Fifty Only)</b>
<b>C</b>	Processing fee of RISL	<b>Rs. 1000.00 (One Thousand Only)</b>
<b>D</b>	Earnest money	<b>Rs. 5.00 Lacs /Exemption Certificate / Vendor Registration of Class “A”.</b>
<b>E</b>	Validity	<b>120 days from the next date of opening of techno-commercial bid.</b>
<b>F</b>	Base date for price variation	<b>01.09.2017(Irrespective of tender opening date)</b>

**IMPORTANT DATES**

<b>S.N.</b>	<b>Events</b>	<b>Date &amp; Time</b>	<b>Location</b>
1	Date of downloading of tender specifications	Up to 10.10.2017 (06:00 PM)	<b><u>www.jdvvn.com &amp; http:eproc.rajasthan.gov.in</u></b>
2	Deposit of cost of Tender Specifications, Processing fee & Earnest Money	Up to 10.10.2017 (4:00 PM)	Office of Sr. A.O (Cash & CPC), JdVVNL , New Power House, Industrial Area, Jodhpur
3	Last Date & time of submission of electronic bid	Up to 11.10.2017 (12:00 NOON)	<b><u>http:eproc.rajasthan.gov.in</u></b>
4	Opening of Technical Bid	<b>11.10.2017 (3:00 PM)</b>	<b><u>http:eproc.rajasthan.gov.in</u></b>
5	Opening of Price Bid	To be intimated separately to the qualified bidders	<b><u>http:eproc.rajasthan.gov.in</u></b>

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1. 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 / Discom 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. JdVVNL 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. JdVVNL 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 (JdVVNL).
- 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
-