Tender No. : **DID3194L15/L6**
Tender Date : **10.04.2014**
Bid Closing On : **22.05.2014 at 13:00 hrs.(IST)**
Bid Opening On : **22.05.2014 at 13:00 hrs.(IST)**

Tender issued to following parties only:

Slno	V_Code	Vendor Name	City/Country
1	200567	AUTOMATIC ELECTRIC LTD	MUMBAI
2	201596	EVERLITE ENGINEERING INDUSTRIES	PANITOLA
3	202289	U.K. ENTERPRISE	GUWAHATI
4	203062	GLOCON	TINSUKIA
5	203709	PATSON TRANSFORMERS PVT.LTD.	BHARUCH
6	208845	BALAJI ELECTRICALS	TINSUKIA
7	401694	POWERMASTER ELECTRICALS PVT LTD	KOLKATA

OIL INDIA LIMITED
(A Govt. of India Enterprise)
P.O. Duliajan-786602, Assam
E-mail:material@oilindia.in, **Fax No.**91-374-2800533

Tender No. & Date : DID3194L15/L6 10.04.2014

Bid Security Amount : INR 0.00 OR USD 0.00
(or equivalent Amount in any currency)

Bidding Type : Single Bid (Composite Bid)

Bid Closing On : 22.05.2014 at 13:00 hrs. (IST)
Bid Opening On : 22.05.2014 at 13:00 hrs. (IST)

Performance Guarantee : Not Applicable

OIL INDIA LIMITED invites Limited tenders for items detailed below:

Item No./ Mat. Code	Material Description	Quantity	UOM
10 0C000603	**TRANSFORMER 100KVA** **TECHNICAL SPECIFICATIONS AS PER ANNEXURE-IA AND ANNEXURE-IIA:**	1	NO
20 0C000603	**TRANSFORMER 100KVA** **TECHNICAL SPECIFICATIONS AS PER ANNEXURE-IB AND ANNEXURE-IIB.**	1	NO

Standard Notes: (1) VALIDITY : Your offer must be valid for 75 days from the date of bid opening. Offer with inadequate validity will be rejected.

(2) The offer should be submitted in **Duplicate**.

(3) Any sum of money due and payable to the contractor (including Security Deposit refundable to them) under this or any other contract may be appropriated by Oil India Limited and set-off against any claim of Oil India Limited (or such other person or persons contracting through Oil India Limited) for payment of a sum of money arising out of this contract or under any other contract made by the contractor with Oil India Limited (or such other person or persons contracting through Oil India Limited).

(4) In the event you authorize your dealer/stockist/channel partner to quote on your behalf, the dealer/stockist/channel partner while submitting bid should mention on the body of the envelope that they are submitting bid on your behalf.

In the event the dealer/stockist/channel partner do not mention the name of their OEM/principal on the body of the envelope, the offer shall be treated as unsolicited offer and will not be considered for opening.

The dealer/stockist/channel partner should take note of above while submitting bid on behalf of

their OEM/principal.

(5) For order with F.O.R. Destination term, 100% payment against despatch documents will not be entertained. In this regards please refer payment terms in ANNEXURE-MM/TENDER/LP/01/06.

(6) To evaluate the inter-se ranking of the offers, Assam Entry Tax on purchase value will be loaded as per prevailing Government of Assam Guidelines as applicable on bid closing date. Bidders may check this with the appropriate authority while submitting their bids.

(7) **Bidder should mention page no./nos. in every pages of their offer.**

(8) In the event of receipt of only a single offer against the tender within B.C. date, OIL reserves the right to extend the B.C. date as deemed fit by company. During the extended period, the bidders who have already submitted the bids on or before the original B.C. date, shall not be permitted to revise their quotation.

Special Notes : 1. Offer shall be completed in all respect to meet the technical specifications and general notes of the NIT.

2. Bidders who are authorised dealersof OEM, shall submit copy of valid dealership certificate/authorisation letter from the OEM along with the offer.

3.Technical catalogues, detailed dimensional drawing and copy of test certificates shall be submitted along with the offer.

4.Transformer shall be guaranteed for minimum one year from the date of receipit at site. Duly stamped Guarantee certificate should be supplied along with the material.If transformer fails during this guarantee period, the supplier shall agree to repair or replace the same at his cost at the manufacturer's works.

5.Packing should be adequate to avoid transit damage and ingress of water.

ANNEXURE-IA

FOR ITEM NO. 10

TRANSFORMER 100KVA
TECHNICAL SPECIFICATIONS:

Design, engineering, manufacture, testing, supply of oil immersed, naturally cooled, three-phase, 50 Hz,**3.3kv/415v**, double-wound, outdoor type distribution transformers of 100 KVA capacity with metallic enclosure Housing of HV & LV bushing

1) STANDARDS:

Unless otherwise modified in this specification, the transformer/materials shall conform in all respect to the relevant Indian/International Standard Specification, with latest amendments thereof some of them are listed below:

Title	India standard	International& Internationally recognized standard
1.1)Specification for Power Transformer	IS-2026:1977-81	IEC-76
1.2)Insulating Oil for transformer & Switchgear	IS-335/1983	BS-148, IEC-296
1.3)Fittings & Accessories for Power Transformer	IS-3639:1968	ASTM D-1275
1.4)High Voltage Porcelain Bushings	IS-2099:1986	IEC 296-1969
1.5)Low Voltage Porcelain Bushings	IS-7421-1988	
1.6)Dimensions for Outdoor Bushings	IS-3347	DIN 42531 to 33
1.7)Specification for Copper wire rods	IS-1244	ASTM B-49
1.8)Specification for colours for ready mixed paints	IS-5/1964	IEC-76
1.9)Guide for loading of oil immersed Transformers	IS-6600/1972	BS-148

1.10)Manual on Transformer
CBI&P Publication No.275 ASTM D-1275

2) Electrical Parameters of the Transformer:

2.1) Rating : 100 KVA.
2.2) Rated HV voltage: 3.3 kV
2.3) Rated LV voltage: 415 volts (phase to phase) and 240 volts (phase to neutral)
2.4) No. of phase: 3
2.5) Connection (HV) : Delta
2.6) Connection (LV) : Star
2.7) Vector Group : Dyn l1
2.8) Installation: Out door type.
2.9) Material of winding: Double wound type Copper
2.10) Type of cooling: ONAN
2.11) Max. Current density in HV & LV winding: 2.6 A / mm2
2.12) Method of system earthing Neutral Solidly earthed system

3) No-Load Voltage Ratio: The no-load voltage ratio shall be 3300/415V

4) TEMPERATURE RISE:

4.1) The temperature-rises of the windings, cores and oil, of transformers designed for operation at altitudes not exceeding those given in 3 of IS : 2026 (Part I)-1977 and with cooling medium temperatures as described in 3 of IS : 2026 (Part I)-1977 shall not exceed the limits specified in Tables 4 when tested in accordance with 4. (As per IS: 2026. part-II)

4.2) The temperature rises over ambient shall not exceed the limits described below:

i) Top oil temperature rise measured by thermometer: 35 deg. C

ii) Winding temperature rise measure by resistance: 40 deg. C
Bidders not meeting the above limits of temperature rise will be treated as non-responsive.

5) LOSSES:

At no load: 260 watt & load at 75 degree C : 1760 watt as per IS: 1180 (part 1)-1989

These losses are maximum allowable and there would not be any positive tolerance. However, the manufacturer can offer losses less than above.

The Bidder shall quote No-Load loss in KW at the rated voltage and frequency.

The load loss in KW at rated voltage, frequency & out put, for the temperature of 75 degree centigrade shall also be quoted. The Bidder shall guarantee these loss figures.

6) IMPEDANCE:

The recommended percentage impedance at 75°C shall not more than 4.5 % with a tolerance as per IS-2026-1977(Table-3)

7) WINDING:

7.1) The primary (HV) windings shall be connected in Delta and the secondary (LV) Winding in Star (Vector system DYn11) so as to produce a positive displacement of 30 degree from the primary to secondary vectors of the same phase. The neutral of secondary windings shall be brought out to a separate insulated neutral terminal. The size (Cross section) of the neutral connection conductors and jumpers must be of same size as that of the phase connecting conductors and jumpers which shall be properly supported and insulated. The neutral is to be solidly earthed in a separate earth pit and the transformer body is to be connected to station grounding system. HV windings shall consist of single coil design. The copper wires for coil formation shall be of sufficient cross-sectional area to impart desired mechanical strength. All delta leads from HT coils as well as HT line leads should be taken out through DPC (damp proof course).

7.2) Double paper covering shall be used for winding insulation both for HV & LV windings. Electrical grade epoxy coated insulated paper shall be used for inter-layer insulation of the HV& LV coils, corrugated cylinder made of pre-compressed board shall be provided between HV & LV winding. Angle shaped and rings made from pre-compressed board shall be used between end coil and the core.The insulation level of the windings shall be as follows as per Part -III of IS-2026)

7.3) The insulation of coils shall be vacuum impregnated in oil to develop full electrical strength in the windings. All material used in the insulation and assembly of the winding shall be insoluble non catalytic and chemically inactive in the hot transformer oil and shall not soften or otherwise be adversely effected under operating conditions.

7.4) The core and coil assembly shall be fully dried out in 'Air Drying oven' till the coils are shrunken to the designed level and are completely dried. Only then they will be impregnated in the transformer oil.

7.5) Minimum gap of 25 mm shall be maintained between the end coils and core.
The minimum insulation resistance values 400 Mega Ohms at 40°C. HT side and 200 mega ohms at 40°C LT side. This is in between winding and earth when the transformer is filled with oil.(As per NETA MTS-1997 (Table-10.1)

7.6) The overloading capacity transformer shall be as per table
1-6 of IS-6600-1972.

7.7) TAP CHANGER/TAPPINGS : The OFF load tap changing shall be effected by an external 3 phase gang operated tap changing switch. The operation shaft shall be brought out of the tank and provided with hand wheel so that it can be operated at standing height from plinth level and be easily accessible. The tap position should correspond to the voltage variation of (+) 5% to (-)7½% in step of 2.5% at HV side with its normal position at 3. A visual tap position indicator shall be provided near the operating handle and provision shall be made to pad lock the handle in each tap position. The locking arrangement shall be such that pad lock cannot be inserted unless required contacts corresponding to the tap position are correctly connected with full contact pressure.

All contacts of the tapping shall be silver plated and held in position under strong contact pressure.Taps shall be provided on high voltage windings. At each tap position, rated output shall be available within allowable range of voltage variation.

8) CORE CONSTRUCTION:

The core shall be high grade rolled grain annealed steel lamination having low loss and good grain properties, coated with hot oil proof insulation, bolted together and to the frames firmly to prevent vibration or noise. The complete design of core must ensure permanency of the core losses with continuous working of the transformers.
The cores shall conform to:
IS : 3024 - 1965 Electrical sheet steel &
IS : 649 - 1983 method of test steel sheet.

9) TANK CONSTRUCTION:

9.1) The tank shall be of robust construction in accordance with the best engineering practice. The main tank of the transformer shall be fabricated from tested quality of mild steel of adequate thickness i.e. minimum 4.00 mm. (for side walls) and 6.00 mm. (for top & bottom plates). The tank shall be valid (V shape welding fillet) inside of tank two outside welding of tank to bear more pressure to avoid bursting

9.2) To provide rigidity and to meet the pressure inside the tank, due to short circuit current, the tank shall be suitably stiffened. The stiffeners wherever applicable are provided on all the four side walls of the tank, designed not to retain water.

9.3) The tank cover shall be slightly sloping towards HV bushing and shall provide facilities for draining of water

9.4) The transformer tank shall be complete with all accessories, lifting lugs and shall be designed as to allow the complete transformer tank, filled with oil to be lifted by crane or other means without risk of any damage and transported by Rail / Road without straining any joint and without causing leakage of oil

9.4) Bolted inspection covers shall be provided on top cover to inspect core, winding and have access to the bottom of bushing

9.5) The tank shall be capable of withstanding the pressure of +/- 1kg /cm2 Without deformation. The transformer body should be welded from inside of the main tank body so that the joint is stronger due to V-shape welding fillet besides the outside welding be additional.

10) INSULATION MATERIALS:

Electrical grade insulation Kraft papers and press Boards of standard should be used. As per IS: 1397-1990

11) PAINTING:

11.1) All paints shall be applied in accordance with the paint manufacturer's recommendations.

11.2) All primers shall be well marked into the surface, particularly in areas where painting is evident, and the first priming coat shall be applied as soon as possible after cleaning. The paint shall be applied by airless spray according to them manufacturer's recommendations. Particular attention shall be paid to the following:
• Surface preparation prior to painting.
• Mixing and thinning
• Application of paints and the recommended limit on time intervals between coats.

11.3) As soon as all items have been cleaned and phosphated within four hours of the subsequent drying, they shall be given suitable anticorrosion protection of Zinc chromate primer

11.4) Heat resistant paint (Hot oil proof) for inside surface

11.5) For external surfaces one coat of Thermo Setting Paint or 2 coats of Zinc chromate followed by 2 coats of polyurethane paint. The color of the finishing coats shall be light admiral gray conforming to ISC No. 697 (table-1) of IS: 5-2007.

12) BUSHINGS:

12.1) The transformer shall be fitted with three high voltages and four low voltage porcelain bushing of HT (3.3kv) voltage and current rating and LV (415V) bushing shall be provided on the side of the tank. Each terminal including the neutral shall be distinctly marked and coloured for phase voltage on both HV and LV sides. The system of marking shall be in accordance with the latest amendment of relevant IS.

12.2) The electrical characteristics of high voltage bushing shall conform to latest version of IS: 2099 and IS 3347. The low voltage bushing shall conform to latest version of IS: 7421. All porcelain bushing shall be homogeneous, free from flaws effecting its mechanical strength or dielectric quality. They should be well vitrified, uniformly glazed, tough and impervious to moisture. The creepage distance of all the bushing shall be 25mm per kV of highest system voltage suitable for heavily polluted atmosphere and the protected creepage distance not less than 50% of total.

12.3) To avoid bimetallic action at the point of connection to the copper windings and to the external aluminum cables, both HV & LV bushing stems shall be made of aluminum alloy / copper confirming to the requirement IS: 3347.

13) FITTINGS AND ACCESSORIES

The transformer shall be fitted with the following fittings & accessories
(a) Two earthing terminals;
(b) Oil level Indicator;
(c) Lifting lugs and Platform lugs
(d) Rating, diagram and terminal marking plate(s)
(e) Silica gel breather of approved design containing min. 0.5kg dehydrated Silica gel.
(f) Drain-cum-sampling valve (steel) welded to the tank.

(g) Thermometer pocket with dial type thermometer on tank cover.
(h) Air Release Plug.
(i) Pressure relief device as standard fitment to operate at a pressure of 03 to 0.5 kg/cm2.
(j) Filling hole having P 1-1/4 thread (with cover) on the conservator.
(k) Filter valve- 2 nos. on top and bottom ends of tank at opposite sides.
(I) Conservator with filling hole and drain plug.
(m) Offload tap changer
(n) Bimetallic terminal connector for HV/LV.
(o) PSR Radiators duly tested for leakage and pressure.
(p) Plain rollers (4 nos., bi directional) suitable for use on 1000 mm gauge track with clamping device or base mounting arrangement as required. Mounting arrangement shall be as per relevant IS.

13.1) Cable terminal boxes and Cable Terminations:
There are two nos. cable terminal boxes for termination of HV & LV both side of the transformer. Cables entries shall be from the bottom of the cable terminal boxes.
a) HV cable box shall be suitable for termination of 1 no 3Cx120 sq.mm XLPE armored aluminium conductor cable with heat shrink type cable termination. The bottom plate shall be detachable type and fitting with one no heavy duty single compression cable gland suitable for 3 x 120 mm. sq XLPE armor cable. Cable terminal boxes shall have degree of protection IP-54.
b) LV cable box shall be suitable for termination of 1 no 3½ C x240 sq.mm PVC Armored conductor cable with heat shrink type cable termination. The bottom plate shall be detachable type and shall be fitted with one no heavy duty single compression cable gland suitable for 3½ Core x 240 mm. sq PVCA cable. Cable terminal boxes shall be as per IP-54.

14) CONSERVATOR:

On Transformers plain tank the provision of conservators is obligatory. When a conservator is provided, oil gauge and dehydrating breathing devise shall be fixed to the conservator which shall also be provided with a drain plug and a filling hole(1¼" normal size thread) with cover. The capacity of a conservator tank shall be designed to contain 10% of the total quantity of oil and its contraction and expansion due to temperature variations. Normally 3% quality of total oil will be contained in the conservator. In addition the cover of main tank shall be provided with an air release plug to enable air trapped within to be released, unless the conservator is so located as to eliminate the possibility of air being trapped within the main tank. The inside diameter of the pipe connecting the conservator to the main tank should be within 30 to 50 mm and it should be projected into the conservator so that its end is approximately 20 mm above the bottom of the conservator so as to create a sump for collection of impurities.

15) SEALING GASKETS

All sealing washers and gaskets shall be made of 'oil and heat resistant Nitrile / Neoprene rubber/synthetic .rubber-bonded cork type RC-70C gaskets. The oil level in the transformer shall be made up to the required level while the transformer filled with oil is maintained at a temperature of 45 Deg. C. All steel screws, nuts and fasteners exposed to atmosphere shall be either galvanized or cadmium plated.

16) TRANSFORMER OIL

16.1) The transformer oil used in transformer shall comply with the requirements of the specification as per IS: 335-1993 (Latest). Oil sample will also be taken out from fresh stock of T/F oil to be tested as per latest IS: 335-1993.

16.2) The important characteristics of the transformer oil after it is filled in the transformer (within 3 months of filling) shall be as follows: -

16.2.1. Electric Strength (Breakdown voltage) 30 kV (Min)
16.2.2. Dielectric dissipation factor (Tan Delta) at 90 deg.C.) 0.01 (Max)
16.2.3. Specific Resistance (Resistivity) at 27 deg. C (ohm-cm) 10 x 10 12
16.2.4. Flash Point, P.M. (closed) 140 º C (Min)
16.2.5. Inter facial tension at 27 º C. 0.03N/M (Min)
16.2.6. Neutralization value (total acidity) 0.05Mg.KOH/gm (Max.)
16.2.7 Water content PPM 35 (Max)

17) TESTS:

17.1 Type Test:
The bidder shall furnish the following type tests reports of a similar transformer along with their offer.
a)Impulse Voltage with stand Test on all three HV phases chopped on tail.
b) Dynamic Short circuit Test
c) Temperature rise test
d) Unbalanced current test
Test shall be successfully carried out at laboratories of similar transformer, accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL)in accordance with IS 2026/1977 as amended from time to time and technical specifications, within the last 5 (five) years prior to the date of offer.

17.2) Routine test: The following routine tests to be carried out at the manufacturer's works. The tests are to be carried out in accordance with the details specified in IS 2026 or as agreed upon between the purchaser and the manufacturer.
17.2.1. Measurement of winding resistance.
17.2.2. Ratio, polarity and phase relationship.
17.2.3. Impedance voltage.
17.2.4. Load losses.
17.2.5. No-load losses and No-load current.
17.2.6. Insulation resistance.
17.2.7. Induced over voltage withstand.
17.2.8. Separate source voltages withstand.

18) DRAWING:

Following Drawings shall be supply by the Bidder along with their offer
i) General Dimensional drawing.
ii) Core Assembly drawing.
iii)Internal Construction Drawing
iv) Rating & Diagram Plate Drawing.
v) HV/LV Bushings indicating measurement of creepage distances

18.1) APPROVAL OF DRAWING: Party should get the detail transformer drawings approved from OIL prior to manufacturing of the transformer.

19) INSPECTION:

Supplier shall give 15 days' advance intimation to the Head Electrical to organize stage inspection in which assembly of core, windings and other core materials etc. would be inspected. In respect of raw materials such as core stamping, winding conductor, oil etc. successful bidder shall use these materials Manufactured/supplied by the standard manufacturers and furnish the manufacturer's test certificates, as well as, proof of purchase from those manufacturers documentary evidence for having paid the excise duty for the information of the department.

19.1) Head Electrical will depute his representative at the time of stage inspection.

19.2) Transformers will be tested for acceptance tests at factory, in the presence of purchaser's representative before dispatch.

19.3) The inspection may be carried out by the purchaser at any stage of manufacture. The successful bidder shall grant free access to the purchaser's representatives at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by the purchaser shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications and shall not prevent subsequent rejection if the equipment is found to be defective.

19.4) If any of the technical particulars are seen to be in variance than the guaranteed technical particulars, the transformer will be rejected without any liability on purchaser.

20) One set of following opeartaing Spares shall be supplied along with the transformer and Price shall be include it with the main offer.

a)3 Nos HT bushing.
b)4 Nos LT bushing
c)One set of Gasket, cut , holed ready for use.

ANNEXURE-IIA

GUARANTEED & OTHER PARTICULARS FOR DISTRIBUTION TRANSFORMERS (To be furnished by the Manufacturer along with the offer.)

SI.N Description

1. Make & Manufacturer :

2. Place of Manufacture :

3. Voltage in kV :

4. Rating in kVA:

5. Core Material used and Grade:
   a)Flux density :
   b)Over fluxing without saturation (Curve to be furnished by the Manufacturer in support of his claim)

6. Maximum temperature rise of :
   a)Windings by resistance method :
   b)Oil by Thermometer :

7. Magnetizing (No load) Current at
   a) Normal Voltage :
   b) Maximum Voltage:

8. Core loss in watts :
   a)Normal Voltage :
   b) Maximum Voltage:

9. Resistance of Windings at 20°C(with 5% tolerance)
   a) HV Winding (ohms):
   b) LV Winding (ohms):

10. Full load losses (watts) at 75°C:

11. No-Load Losses at 75°C (watts):

12. Current density used for
   a) HV Winding:
   b) LV Winding:

13. Clearances
   a) Core & LV:
   b) LV & HV:
   c) HV Phase to Phase:

14. Regulation of voltage in percent.
   a)100% load

b)50 % load
c)25 % load
d)0.8 P.F. at 75 deg. C:

15. % Impedance at 75 deg. C:

16. Flash Test
a)HV 28 kV/ 50 HZ for 1 minute:
b)LV 3 kV/ 50 HZ for 1 minute:

17. Over potential Test Double Voltage:

18. Double frequency for 1 minute:

19. Impulse test:

20. Weight content of
a) Core Lamination (min.):
b) Windings (min.):
c) Tank & Fittings:(Thickness of side walls & thickness of top/bottom plate of DT)
d) Oil:
e) Oil qty (min.):
f) Total Weight:

21. Oil Data
1.Qty for first filling (mm):
2. Grade of oil used:
3. Maker's name:
4. BDV at the time of filling:

22. Transformer:
1) Overall length x breadth x height:
2) Tank length x breadth x height:
3) Thickness of plates for
a) Side plate (min.):
b) Top & Bottom plate (min.):

23. Radiation:
1) Heat dissipation by tank walls exclusive & bottom:
2) Heat dissipation by cooling tube:
3) Dia. & thickness of cooling tube:
4) Whether calculation sheet for selecting cooling area to ensure that the transformer is capable of giving continuous rated output without exceeding temperature rise is enclosed: Yes/No

24. Inter layer insulation provided in design for
1) Top & bottom layer:
2) In between all layer:
3) Details of end insulation:
4) Whether wedges are provide at 50 % turns of the HV coil:

25. Insulation materials provided
a) For Conductors (1) HV (2) LV:
b) For Core:

26. Material and Size of the wire used
1) HV
a) SWG/mm:
b) Dia:
2) LV
a) Strip size:
b) No. of Conductors in parallel:
c) Total area of cross section (sq. mm.):

27. Is the name plate gives all particulars as required in Ten

28. Particulars of Bushings HV/ LV
1) Maker's name:
2) Type IS-3347/IS- 1180
3) Rating as per I.S.:
4) Dry power frequency voltage withstand test:
5) Wet power frequency voltage withstand test:

Note: The following shall be specifically confirmed
1. Whether the offer conforms to the limits of impedance mentioned in the Specification: Yes / No
2. Whether the offer conforms to the limits of temperature rise mentioned in the specification: Yes / No
3. Whether the losses of the transformers offered are within the limits specified: Yes / No
4. Whether the transformers offered is already type for the design and test: yes / No
5. Opeartaing Spares, bushing and gasket are supply along with
the transformer: yes or No

ADDITIONAL DETAILS
SI. No. Description
1. Core Grade:
2. Core diameter (mm):
3. Gross Core area (cm):
4. Net Core area (cm):
5. Flux density (Tesla):
6. Wt. of Core (kg.):
7. Loss per kg. of Core at the Specified Flux density (Watts):
8. Core window height:
9. Center to center distance of the core (mm):
10. No. of LV. Turns:
11. No. of HV turns:
12. Size of LV Conductor bare/ covered (mm):
13. Size of HV conductor bare/ covered (mm):
14. No. of parallels

15. Current density of LV winding amps/sq.mm:
16. Current density of HV winding amps/ sq.mm:
17. Wt. of the LV winding for Transformer kg:
18. Wt. of the HV winding for Transformer kg:
19. No. of LV Coils/phase:
20. No. of HV coils/phase:
21. Height of LV Windings mm:
22. Height of HV Windings mm:
23. ID/OD of LV Winding mm:
24. ID/OD of HV winding mm:
25. Size of the duct in LV winding mm:
26. Size of the duct in HV winding mm:
27. Size of the duct between HV & LV mm:
28. HV winding to LV winding clearance mm:
29. HV winding to tank clearance mm:
30. Calculated impedance %:
31. HV to earth creepage distance :

ANNEXURE-I B

FOR ITEM NO.20

TRANSFORMER 100KVA
TECHNICAL SPECIFICATIONS:

Design, engineering, manufacture, testing, supply of oil immersed, naturally cooled, three-phase, 50 Hz,**11kv/415v**, double-wound, outdoor type distribution transformers of 100 KVA capacity with metallic enclosure Housing of HV & LV bushing

1) STANDARDS:

Unless otherwise modified in this specification, the transformer/materials shall conform in all respect to PP the relevant Indian/International Standard Specification, with latest amendments thereof some of them are listed below:

Title	India standard ,International& Internationally recognized standard
1)Specification for Power Transformer	
IS-2026:1977-81	IEC-76
1.2)Insulating Oil for transformer & Switchgear	
IS-335/1983	BS-148, IEC-296
1.3)Fittings & Accessories for Power Transformer	
IS-3639:1968	ASTM D-1275
1.4)High Voltage Porcelain Bushings IS-2099:1986	IEC 296-1969
1.5)Low Voltage Porcelain Bushings IS-7421-1988	
1.6)Dimensions for Outdoor Bushings IS-3347	DIN 42531 to 33
1.7)Specification for Copper wire rods IS-1244	ASTM B-49
1.8)Specification for colours for ready mixed paints	
IS-5/1964	IEC-76
1.9)Guide for loading of oil immersed Transformers	
IS-6600/1972	BS-148

1.10)Manual on Transformer
CBI&P Publication No.275 ASTM D-1275

2) Electrical parameters of the transformer:

2.1) Rating : 100 KVA.
2.2) Rated HV voltage: 11 kV
2.3) Rated LV voltage: 415 volts (phase to phase) and 240 volts (phase to neutral)
2.4) No. of phase : 3
2.5) Connection (HV) : Delta
2.6) Connection (LV) : Star
2.7) Vector Group : Dyn l1
2.8) Installation : Out door type.
2.9) Material of winding:Double wound type Copper
2.10) Type of cooling: ONAN
2.11) Max. Current density in HV & LV winding: 2.6 A / mm2
2.12) Method of system earthing Neutral Solidly earthed system

3) No-Load Voltage Ratio:

The no-load voltage ratio shall be 11000/415V

4) TEMPERATURE RISE:

4.1) The temperature-rises of the windings, cores and oil, of transformers designed for operation at altitudes not exceeding those given in 3 of IS : 2026 (Part I)-1977 and with cooling medium temperatures as described in 3 of IS : 2026 (Part I)-1977 shall not exceed the limits specified in Table 4 when tested in accordance with 4 of IS: 2026. part-II

4.2) The temperature rises over ambient shall not exceed the limits described below:
i) Top oil temperature rise measured by thermometer: 35°C.
ii)Winding temperature rise measure by resistance: 40°C
Bidders not meeting the above limits of temperature rise will be treated as non-responsive.

5) LOSSES:

At no load 260 watt & load at 75 degree C : 1760 watt as per 16.1 of IS: 1180 (part 1)-1989

These losses are maximum allowable and there would not be any positive tolerance. However, the manufacturer can offer losses less than above.

The Bidder shall quote No-Load loss in KW at the rated voltage and frequency.

The load loss in KW at rated voltage, frequency & out put, for the temperature of 75 degree centigrade shall also be quoted. The Bidder shall guarantee these loss figures.

6) IMPEDANCE:

The recommended percentage impedance at 75°C shall not more then 4.5 % with a tolerance as per IS 2026-1977 (Table-3)

7) WINDING:

7.1) The primary (HV) windings shall be connected in Delta and the secondary (LV)Winding in Star (Vector system DYn11) so as to produce a positive displacement of 30 degree from the primary to secondary vectors of the same phase. The neutral of secondary windings shall be brought out to a separate insulated neutral terminal. The size (Cross section) of the neutral connection conductors and jumpers must be of same size as that of the phase connecting conductors and jumpers which shall be properly supported and insulated.The neutral is to be solidly earthed in a separate earth pit and the transformer body is to be connected to station grounding system. HV windings shall consist of single coil design. The copper wires for coil formation shall be of sufficient cross-sectional area to impart desired mechanical strength. All delta leads from HT coils as well as HT line leads should be taken out through DPC (damp proof course).

7.2) Double paper covering shall be used for winding insulation both for HV & LV windings. Electrical grade epoxy coated insulated paper shall be used for inter-layer insulation of the HV& LV coils, corrugated cylinder made of pre-compressed board shall be provided between HV & LV winding. Angle shaped and rings made from pre-compressed board shall be used between end coil and the core.

7.3) The insulation of coils shall be vacuum impregnated in oil to develop full electrical strength in the windings. All material used in the insulation and assembly of the winding shall be insoluble non catalytic and chemically inactive in the hot transformer oil and shall not soften or otherwise be adversely effected under operating conditions.

7.4) The core and coil assembly shall be fully dried out in 'Air Drying oven' till the coils are shrunken to the designed level and are completely dried. Only then they will be impregnated in the transformer oil.

7.5) Minimum gap of 25 mm shall be maintained between the end coils and core.
The minimum insulation resistance values 400 Mega Ohms at 40 degree cert. HT side and 200 mega ohms at 40 degree cent LT side. This is in between winding and earth when the transformer is filled with oil.(As per NETA MTS-1997, Table-10.1)

7.6) The overloading capacity transformer shall be as per Table 1-6 of IS-6600-1972

7.7) TAP CHANGER/TAPPINGS : The OFF load tap changing shall be effected by an external 3 phase gang operated tap changing switch. The operation shaft shall be brought out of the tank and provided with hand wheel so that it can be operated at standing height from plinth level and be easily accessible. The tap position should correspond to the voltage variation of (+)5% to (-) 7½% in step of 2.5% at HV side with its normal position at 3. A visual tap position indicator shall be provided near the operating handle and provision shall be made to pad lock the handle in each tap position. The locking arrangement shall be such that pad lock can not be inserted unless required contacts corresponding to the tap position are correctly connected with full contact pressure. All contacts of the tapping shall be silver plated and held in position under strong contact pressure.Taps shall be provided on high voltage

windings. At each tap position, rated output shall be available within allowable range of voltage variation.

8) CORE CONSTRUCTION:

The core shall be high grade rolled grain annealed steel lamination having low loss and good grain properties, coated with hot oil proof insulation, bolted together and to the frames firmly to prevent vibration or noise. The complete design of core must ensure permanency of the core losses with continuous working of the transformers.
The cores shall conform to :
IS : 3024 - 1965 Electrical sheet steel & IS : 649 - 1983 method of test steel sheet.

9) TANK CONTRUCTION:

9.1) The tank shall be of robust construction in accordance with the best engineering practice. The main tank of the transformer shall be fabricated from tested quality of mild steel of adequate thickness i.e. minimum 4.00 mm. (for side walls) and 6.00 mm. (for top & bottom plates). The tank shall be valid (V shape welding fillet) inside of tank two outside welding of tank to bear more pressure to avoid bursting

9.2) To provide rigidity and to meet the pressure inside the tank, due to short circuit current, the tank shall be suitably stiffened. The stiffeners wherever applicable are provided on all the four side walls of the tank, designed not to retain water.

9.3) The tank cover shall be slightly sloping towards HV bushing and shall provide facilities for draining of water

9.4) The transformer tank shall be complete with all accessories, lifting lugs and shall be designed as to allow the complete transformer tank, filled with oil to be lifted by crane or other means without risk of any damage and transported by Rail / Road without straining any joint and without causing leakage of oil. Bolted inspection covers shall be provided on top cover to inspect core, winding and have access to the bottom of bushing

9.5) The tank shall be capable of withstanding the pressure of +/- 1kg /cm2 Without deformation. The transformer body should be welded from inside of the main tank body so that the joint is stronger due to V-shape welding fillet besides the outside welding be additional.

10) Insulation Materials:
Electrical grade insulation Kraft papers and press Boards of standard should be used.

11) PAINTING:

11.1) All paints shall be applied in accordance with the paint manufacturer's recommendations.

11.2) All primers shall be well marked into the surface, particularly in areas where painting is evident, and the first priming coat shall be applied as soon as possible after cleaning. The paint shall be applied

by airless spray according to them manufacturer's recommendations. Particular attention shall be paid to the following:

• Surface preparation prior to painting.
• Mixing and thinning
• Application of paints and the recommended limit on time intervals between coats.

11.3) As soon as all items have been cleaned and phosphated within four hours of the subsequent drying, they shall be given suitable anticorrosion protection of Zinc chromate primer

11.4) Heat resistant paint (Hot oil proof) for inside surface

11.5) For external surfaces one coat of Thermo Setting Paint or 2 coats of Zinc chromate followed by 2 coats of polyurethane paint. The color of the finishing coats shall be light admiral gray conforming to No. 697 of IS: 5:1961.

12) BUSHINGS:

12.1) The transformer shall be fitted with three high voltages and four low voltage porcelain bushing of HT (11kv) voltage and current rating and LV (415V) bushing shall be provided on the side of the tank. Each terminal including the neutral shall be distinctly marked and coloured for phase voltage on both HV and LV sides. The system of marking shall be in accordance with the latest amendment of relevant IS.

12.2) The electrical characteristics of high voltage bushing shall conform to latest version of IS: 2099 and IS 3347. The low voltage bushing shall conform to latest version of IS: 7421. All porcelain bushing shall be homogeneous, free from flaws
effecting its mechanical strength or dielectric quality. They should be well vitrified,uniformly glazed, tough and impervious to moisture. The creepage distance of all the bushing shall be 25mm per kV of highest system voltage suitable for heavily polluted atmosphere and the protected creepage distance not less than 50% of total.

12.3) To avoid bimetallic action at the point of connection to the copper windings and to the external aluminum cables, both HV(11kv) & LV(415V) bushing stems shall be made of aluminum alloy / copper confirming to the requirement IS: 3347.

13) FITTINGS AND ACCESSORIES

The transformer shall be fitted with the following fittings & accessories
a) Two earthing terminals;
b) Oil level Indicator;
(c) Lifting lugs and Platform lugs
(d) Rating, diagram and terminal marking plate(s)
(e) Silica gel breather of approved design containing min. 0.5kg dehydrated Silica gel.
(f) Drain-cum-sampling valve (steel) welded to the tank.
(g) Thermometer pocket with dial type thermometer on tank cover.
(h) Air Release Plug.
(i) Pressure relief device as standard fitment to operate at a pressure of 03 to 0.5 kg/cm2.
j) Filling hole having P 1-1/4 thread (with cover) on the conservator.

(k) Filter valve- 2 nos. on top and bottom ends of tank at opposite sides.
(I) Conservator with filling hole and drain plug.
(m) Offload tap changer
(n) Bimetallic terminal connector for HV/LV.
(o) PSR Radiators duly tested for leakage and pressure.
(p) Plain rollers (4 nos., bi directional) suitable for use on 1000 mm gauge track with clamping device or base mounting arrangement as required. Mounting arrangement shall be as per relevant IS.

13.1) Cable terminal boxes and Cable Terminations:

There are two nos. cable terminal boxes for termination of HV & LV both side of the transformer. Cables entries shall be from the bottom of the cable terminal boxes.
a) HV cable box shall be suitable for termination of 1 no 3Cx120 sq.mm XLPE armored aluminium conductor cable with heat shrink type cable termination. The bottom plate shall be detachable type and shall be fitted with one no heavy duty single compression cable gland suitable for 3 x 120 mm. sq XLPE armor cable. Cable terminal boxes shall have degree of protection IP-54.
b) LV cable shall be suitable for termination of 1 no 3c½ C x240 sq.mm PVC Armored aluminium conductor cable with heat shrink type cable termination. The bottom plate shall be detachable type and fitted with one no heavy duty single compression cable gland suitable for 3½ C x 240 mm. sq PVC armor cable. Cable terminal boxes shall be as per IP-54.

14) CONSERVATOR:

On Transformers plain tank the provision of conservators is obligatory. When a conservator is provided, oil gauge and dehydrating breathing devise shall be fixed to the conservator which shall also be provided with a drain plug and a filling hole(1¼" normal size thread) with cover. The capacity of a conservator tank shall be designed to contain 10% of the total quantity of oil and its contraction and expansion due to temperature variations. Normally 3% quality of total oil will be contained in the conservator. In addition the cover of main tank shall be provided with an air release plug to enable air trapped within to be released, unless the conservator is so located as to eliminate the possibility of air being trapped within the main tank. The inside diameter of the pipe connecting the conservator to the main tank should be within 30 to 50 mm and it should be projected into the conservator so that its end is approximately 20 mm above the bottom of the conservator so as to create a sump for collection of impurities.

15) SEALING GASKETS

All sealing washers and gaskets shall be made of 'oil and heat resistant Nitrile / Neoprene rubber/synthetic rubber-bonded cork type RC-70C gaskets. The oil level in the transformer shall be made up to the required level while the transformer filled with oil is maintained at a temperature of 45 Deg. C. All steel screws, nuts and fasteners exposed to atmosphere shall be either galvanized or cadmium plated.

16) TRANSFORMER OIL

16.1) The transformer oil used in transformer shall comply with the requirements of the specification as per IS: 335-1993 (Latest). Oil sample will also be taken out from fresh stock of T/F oil to be tested as per latest IS: 335-1993.

16.2) The important characteristics of the transformer oil after it is filled in the transformer (within 3 months of filling) shall be as follows: -
1. Electric Strength (Breakdown voltage) 30 kV (Min)
2. Dielectric dissipation factor (Tan Delta) at 90°C) 0.01 (Max)
3. Specific Resistance (Resistivity) at 27°C (ohm-cm) 10 x 10 12
4. Flash Point, P.M. (closed) 140ºC (Min)
5. Inter facial tension at 27ºC. 0.03N/M (Min)
6. Neutralization value (total acidity) 0.05Mg.KOH/gm (Max.)
7 Water content PPM 35 (Max)

17) TESTS:

17.1 Type Test:
The bidder shall furnish the following type tests reports of similar transformer along with their offer.
a) Impulse Voltage with stand Test on all three HV phases chopped on tail.
b) Dynamic Short circuit Test
c) Temperature rise test
d) Unbalanced current test

Test shall be successfully carried out at laboratories of similar transformer, accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL)in accordance with IS 2026/1977 as amended from time to time and technical specifications, within the last 5 (five) years prior to the date of offer.

17.2) Routine test: The following routine tests to be carried out at the manufacturer's works. The tests are to be carried out in accordance with the details specified in IS 2026 or as agreed upon between the purchaser and the manufacturer.
1. Measurement of winding resistance.
2. Ratio, polarity and phase relationship.
3. Impedance voltage.
4. Load losses.
5. No-load losses and No-load current.
6. Insulation resistance.
7. Induced over voltage withstand.
8. Separate source voltages withstand.

18) DRAWING:

Following Drawings shall be supply by the Bidder along with their offer.
a) General Dimensional drawing.
b) Core Assembly drawing.
c) Internal Construction Drawing
d) Rating & Diagram Plate Drawing.
e) HV/LV Bushings indicating measurement of creepage distances

18.1) APPROVAL OF DRAWING:
Party should get the detail transformer drawings approved from OIL prior to manufacturing of the transformer.

19) INSPECTION:

Supplier shall give 15 days' advance intimation to the Head Electrical to organize stage inspection in which assembly of core, windings and other core materials etc. would be inspected. In respect of raw materials such as core stamping, winding conductor, oil etc. successful bidder shall use these materials Manufactured/supplied by the standard manufacturers and furnish the manufacturer's test certificates, as well as, proof of purchase from those manufacturers documentary evidence for having paid the excise duty for the information of the department.

19.1) Head Electrical will depute his representative at the time of stage inspection.

19.2) Transformers will be tested for acceptance tests at factory, in the presence of purchaser's representative before dispatch.

19.3) The inspection may be carried out by the purchaser at any stage of manufacture. The successful bidder shall grant free access to the purchaser's representatives at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by the purchaser shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications and shall not prevent subsequent rejection if the equipment is found to be defective.

19.4) If any of the technical particulars are seen to be in variance than the guaranteed technical particulars, the transformer will be rejected without any liability on purchaser.

20) One set of following opeartaing Spares shall be supplied along with the transformer and Price shall be include it with the main offer.

a)3 Nos HT bushing.
b)4 Nos LT bushing
c)One set of Gasket, cut , holed ready for use.

ANNEXURE-IIB

GUARANTEED & OTHER PARTICULARS FOR DISTRIBUTION TRANSFORMERS (To be furnished by the Manufacturer along with the offer.)

SI.No Description

1. Make & Manufacturer :

2. Place of Manufacture :

3. Voltage in kV :

4. Rating in kVA:

5. Core Material used and Grade:
   a)Flux density :
   b)Over fluxing without saturation (Curve to be furnished by the Manufacturer in support of claim)

6. Maximum temperature rise of :
   a)Windings by resistance method :
   b)Oil by Thermometer :

7. Magnetizing (No load) Current at
   a) Normal Voltage :
   b) Maximum Voltage:

8. Core loss in watts :
   a)Normal Voltage :
   b) Maximum Voltage:

9. Resistance of Windings at 20°C(with 5% tolerance)
   a) HV Winding (ohms):
   b) LV Winding (ohms):

10. Full load losses (watts) at 75°C:

11. No-Load Losses at 75°C (watts):

12. Current density used for
   a) HV Winding:
   b) LV Winding:

13. Clearances
   a) Core & LV:
   b) LV & HV:
   c) HV Phase to Phase:

14. Regulation of voltage in percent.
a)100% load
b)50 % load
c)25 % load
d)0.8 P.F. at 75 deg. C:

15. % Impedance at 75 deg. C:

16. Flash Test
a)HV 28 kV/ 50 HZ for 1 minute:
b)LV 3 kV/ 50 HZ for 1 minute:

17. Over potential Test Double Voltage:

18. Double frequency for 1 minute:

19. Impulse test:

20. Weight content of
a) Core Lamination (min.):
b) Windings (min.):
c) Tank & Fittings:(Thickness of side walls & thickness of top/bottom plate of DT)
d) Oil:
e) Oil qty (min.):
f) Total Weight:

21. Oil Data
1.Qty for first filling (mm):
2. Grade of oil used:
3. Maker's name:
4. BDV at the time of filling:

22. Transformer:
1) Overall length x breadth x height:
2) Tank length x breadth x height:
3) Thickness of plates for
a) Side plate (min.):
b) Top & Bottom plate (min.):

23. Radiation:
1) Heat dissipation by tank walls exclusive & bottom:
2) Heat dissipation by cooling tube:
3) Dia. & thickness of cooling tube:
4) Whether calculation sheet for selecting cooling area to ensure that the transformer is capable of giving continuous rated output without exceeding temperature rise is enclosed: Yes/No

24. Inter layer insulation provided in design for
1) Top & bottom layer:
2) In between all layer:

3) Details of end insulation:
4) Whether wedges are provide at 50 % turns of the HV coil:

25. Insulation materials provided
a) For Conductors (1) HV (2) LV:
b) For Core:

26. Material and Size of the wire used
1) HV
a) SWG/mm:
b) Dia:
2) LV
a) Strip size:
b) No. of Conductors in parallel:
c) Total area of cross section (sq. mm.):

27. Is the name plate gives all particulars as required in Ten

28. Particulars of Bushings HV/ LV
1) Maker's name:
2) Type IS-3347/IS- 1180
3) Rating as per I.S.:
4) Dry power frequency voltage withstand test:
5) Wet power frequency voltage withstand test:

Note: The following shall be specifically confirmed
1. Whether the offer conforms to the limits of impedance mentioned in the Specification: Yes / No
2. Whether the offer conforms to the limits of temperature rise mentioned in the specification: Yes / No
3. Whether the losses of the transformers offered are within the limits specified: Yes / No
4. Whether the transformers offered is already type for the design and test: Yes / No
5.Opeartaing Spares, bushing and gasket are supply along with the transformer: Yes or No

ADDITIONAL DETAILS
SI. No. Description
1. Core Grade:
2. Core diameter (mm):
3. Gross Core area (cm):
4. Net Core area (cm):
5. Flux density (Tesla):
6. Wt. of Core (kg.):
7. Loss per kg. of Core at the Specified Flux density (Watts):
8. Core window height:
9. Center to center distance of the core (mm):
10. No. of LV. Turns:
11. No. of HV turns:
12. Size of LV Conductor bare/ covered (mm):
13. Size of HV conductor bare/ covered (mm):
14. No. of parallels

15. Current density of LV winding amps/sq.mm:
16. Current density of HV winding amps/ sq.mm:
17. Wt. of the LV winding for Transformer kg:
18. Wt. of the HV winding for Transformer kg:
19. No. of LV Coils/phase:
20. No. of HV coils/phase:
21. Height of LV Windings mm:
22. Height of HV Windings mm:
23. ID/OD of LV Winding mm:
24. ID/OD of HV winding mm:
25. Size of the duct in LV winding mm:
26. Size of the duct in HV winding mm:
27. Size of the duct between HV & LV mm:
28. HV winding to LV winding clearance mm:
29. HV winding to tank clearance mm:
30. Calculated impedance %:
31. HV to earth creepage distanc: