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Annexure-B

TECHNICAL SPECIFICATION FOR 11 KV COPPER WOUND MEASURING THREE PHASE (THREE SINGLE PHASE CTs AND ONE THREE PHASE STAR/STAR PT) COMBINED C.T.P.T. UNIT OF ACCURACY CLASS 0.5s.

IMPORTANT NOTES:

- 1 Supplier should submit their details asked in Annexure – I and I-A & I-B. MGVCL.
- 2 No offer will be considered if it is submitted other than the above Annexure – I and I-A&I-B.
- 3 Annexure –I is MGVCL’s requirement. If the bidder wants to offer any deviation in MGVCL’s requirement, the same should be brought out in Annexure: I-B only with detailed reasons. However, deviations should not affect MGVCL technical specification requirements. If Deviations affects the technical specification requirements, they shall not be accepted. If there is no deviation, then also it is required to put this Annexure: I-B with tender indicating no deviation.
- 4 Though Annexure: I–A is design parameters, the supplier has to submit the same compulsorily for our reference.
- 5 No subsequent correspondence or any submissions made after the opening of Technical Bid will be entertained. The offer will be disqualified if, any such attempt is made by the bidder.

SPECIFICATION FOR 11 KV COPPER WOUND MEASURING THREE PHASE (THREE SINGLE PHASE CTs AND ONE THREE PHASE STAR/STAR PT) COMBINED C.T.P.T. UNIT.

01 SCOPE:

This specification covers design, manufacture, testing at manufacture’s works and inspection, supply and delivery of oil-filled conventional type, outdoor type, pole-mounted, combined 11 KV copper wound CTPT unit.

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“The combined CTPT unit shall be comprised of three single-phase current transformers and one three-phase voltage transformers having primary star point of primary winding shall not be EARTHED (i.e. floating Neutral) and secondary star neutral points should not to be EARTHED on LV side and shall be brought out in the secondary terminal box”

02 OPERATION CONDITION:

The CT-PT units to be supplied against this specification shall be suitable for satisfactory continuous operations under the following tropical conditions.

2.1 AMBIENT CONDITIONS:

Maximum Ambient Air Temperature	55°C
Minimum Ambient Air Temperature	5°C
Maximum daily average ambient air temperature	35°C
Maximum humidity	99%
Altitude above M.S.L. (maximum)	1000Mtr
Average annual rainfall (mm)	925
Max. wind pressure(Kg/sqm)	260
Average number of rainy days per Annum	90
Seismic level (Horizontal accn.)	0.3 g
Iso-ceraunic level(Days per Year)	50
Average thunder storm days per annum	50
Note: The climatic conditions are prone to wide variations in ambient conditions and hence the equipment shall be of suitable design to work satisfactorily under these conditions.	

2.2 INSTALLATION:

Outdoor pole-mounted in the atmosphere which is normally polluted. The CT-PT units shall also function satisfactorily if installed in the Sea Shore area having a saline atmosphere and in chemically polluted areas.

2.3 SYSTEM PARTICULARS / DISTRIBUTION NETWORK PARAMETERS:

The normal system parameters of the distribution network are as below.

Max. System Voltage	12 kV
Nominal System Voltage	11 KV
No of phases	Three
System Frequency	50 Hz±5 %
Fault Level (Minimum)	20 KA For 3 sec.

It is also pertinent to state that the system commonly may contained of various type and order of Harmonics generated by consumers. In view of which adequate care shall be taken in design and manufacturing of unit. The remedial measures taken or proposed to be taken shall be intimated in detail with technical write up.

03 **APPLICABLE STANDARDS:**

Unless otherwise specifically stated in these specifications of CTPT Units shall conform latest version/amendments to the following standards. All the Indian Electricity rules/Bills/amendments up to date applicable for clearance, safety and operation of the equipment

Sr. No.	List of Standard	Detail of Standard
1)	IS 16227 (Part -I & II)	Requirements for Current transformers
2)	IS 16227 (Part-I & III)	Requirements for Voltage transformers
3)	IS 16227 (Part-IV)	Additional Requirements for Combined Transformers
4)	IS-12943	Brass glands for PVC cables
5)	IS-13730	Requirements for winding wire
6)	IS-5621	Hollow porcelain isolator or bushing
7)	IS-3347	Dimensions for bushings
8)	IS-335	New insulation Oil
9)	IS-2062	Structural Steel (Std. quality)
10)	IS-5	Colors for ready mix paints
11)	IS-2629	Galvanizing
12)	IS-3025(2015)	Grain Oriented Electrical Steel Sheets and Strips
13)	IS 4253-2	Cork composition sheets, Part 2: Cork and Rubber
14)	IS 11149	Rubber Gaskets

04 **RATING AND PERFORMANCE: -**

	Description	Requirement for CT	Requirement for PT
(a)	Type	Three single phase CTs	One Three phase Star/Star PT.
(b)	Accuracy Class	0.5S	0.5
(c)	Ref. frequency Hz	50 Hz	50 Hz
(d)	Rated primary / current Amp. for: 11 KV:-	10, 15, 20, 25, 30, 40, 50, 75, 100, 150, 200, 250 Amp.	N / A
(e)	Rated Secondary current Amp.	5 Amp.	N / A
(f)	Rated primary voltage	N / A	11000 V (Phase to phase)
(g)	Rated Secondary voltage	N / A	110 V (Phase to Phase)
(h)	Rated burden	5 VA per phase at 0.8 P.F. (Lag)	10VA per Phase at 0.8P.F. (Lag)
(i)	Rated voltage factor	N / A	1.2 times continuous and 1.5 times for 30 seconds for 11 KV
(j)	Short time current rating (I_{th})		
	(i) a. Thermal rating	STC 6.4 KA for 1 second for	N / A

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	(i) b. Current density at rated current (max)	10/5 Amp. rating and above for 11 KV Upto and including 50/5 :- 6.4 KA for 1 sec >50/5 Upto and including 100/5 :- 13.1 KA for 1 sec >100/5 Upto and including 250/5 :- 18.4 KA for 1 sec 1.5 Amp. Sq. mm or better for both primary and secondary winding	
	(ii) Rated Dynamic Current rating	2.5 times rated short time thermal current (I_{th}) for 11KV	N / A
(k)	One minute high voltage power frequency withstand voltage On primary winding KV rms On secondary winding KV rms.	28KV(rms) for 1 minute for 11KV (Subsequent tests on the unit should also be performed at 28 KV irrespective of number of tests earlier carried out. This is the special requirement of DISCOM. The DISCOM also reserves the right to carry out this test at DISCOM's Lab/any approved NABL Lab; after receipt of CTPT unit. Design of CTPT unit shall be in such a way that it should withstand stated test) 3KV(rms) for 1 minute	28KV(rms) for 1 minute for 11KV (The DISCOM reserves the right to carry out this test, as per IS, after receipt of CTPT unit at DISCOM's Hi-tech/ any approved NABL Lab. Design of CTPT unit shall be in such a way that it should withstand during test) 3KV(rms) for 1 minute
(l)	1.2/50 impulse withstand voltage	75 KV (Peak) for 11KV Class	75KV (Peak) for 11KV Class
(m)	Winding materials	High grade electrolytic Copper	High grade electrolytic Copper
(n)	Class of insulation	A	A
(o)	Instrument Security	5 or Less than 5	N / A

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Date:

Place:

	Factor		
(p)	Max. Allowable Temp. rise for winding	55° C	55° C

05 BUSHING:

- 5.1** Brown glazed HV bushing of approved make shall be mounted as stated in 4(d) of Annexure-I on the top cover of the tank. The list of approved suppliers for Porcelain insulators may be obtained from this office. The hollow porcelain bushings shall be confirmed to IS-5621. The bushing rod/stud shall be of tinned/nickel plated copper with minimum coating thickness of 50 microns. The bushing cap, 2 Nos of vicer & 3 nos of nuts (1 Lock nut and 2 nut for terminal connections) shall be provided with tinned/nickel plated brass with thickness of 50 microns. Plain washer (minimum 2.0 mm thick electroplated) shall be provided. Additionally, Spring washer shall also be provided.
- 5.2** Bushing fitting GI Ring provision should be made up of MS plate of thickness not less than 2 mm and having galvanizing not less than 50 microns. Bushing clamping and accessories together with the connected bolts/studs shall be hot dip galvanized. All the nuts and washers for bushing clamp shall be SS-304.
- 5.3** The HV bushings shall have to be installed on top plate on turret, flange and gaskets to prevent eventual entry of water/Moisture. The Gasket shall be of 6 mm thickness (-0.25 mm, +not limited) and confirming to type III as per IS 11149. The offered gasket shall be type tested and all type tests as per IS 11149 shall be submitted along with bid.
Marking - The following details shall be clearly indicated on gasket sheet for any identification: a) Manufacturer's name, b) Type of gasket, and c) Date of manufacture as per IS 11149 with BIS marking should be provided.
- 5.4** Bushing turret height shall be a minimum of 20 mm.
- 5.5** The Bushings should be inclined outside to have higher clearance between two terminals of same phase. The minimum distance between conductive part of two bushings shall be 255 mm.
- 5.6** HV Tinned Copper stud/bushing rod of M12 for CTPT below 75/5 Amp and M20 for CTPT of 75/5 Amp and above ratings. For which suitable connectors/lugs are to be supplied by the supplier and the same should be confirmed during the inspection.

06 TRANSFORMER OIL:

- 6.1** The transformer oil to be supplied in the CTPT tank shall be New filtered insulating oil (Uninhibited Type-II) conforming to requirements when tested

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according to IS-335. Electric strength- Break down voltage shall be 70KV, Min. as per Cl. 6.4 of IS: 335:2018. Transformer oil to be used in CT-PT unit shall be invariably filtered.

6.2 The CT-PT shall be so constructed as to ensure that the oil does not flow or leak out even when the CT-PT is used continuously at the maximum allowable temperature.

After draining oil from CT-PT from a one sample of the offered lot, the BDV test should be performed on the same oil. The BDV test value should be more than 70 KV. In case of failure of testing of oil, entire lot of CTPT shall be rejected. These random inspections may be entrusted to a third party. The sampling of the oil should be carried out as per relevant standard.

07 TANK:

7.1 The tank shall be fabricated from a fresh MS Sheet of 4mm, thickness for top cover, flange, and bottom plate of the tank. The side walls of the unit shall be having minimum 2.5mm thickness to withstand built-in pressure occurred during the expansion of oil during temperature rise or forces generated during a short circuit. The exposed fabricated tank with over and other ferrous fittings shall be thoroughly cleaned, scrapped process and hot-dip galvanized as per relevant IS-2629. All nuts, bolts, washers, screws, etc. exposed to the atmosphere shall be of 304-grade of stainless steel.

7.2 The curb of the tank shall be a minimum of 40 mm wide. The top cover shall have a slope of a minimum of 10 degrees to drain off the water in the rainy season. The resistant gasket of neoprene rubber or nitril or synthetic rubberized cork of a 5mm thickness (-0.25 mm,+not limited) shall be provided conforming to type III as per IS 11149/ type-c as per IS 4253 (Part-2) . An adequate number of SS-304 grade bolts of M12 x 35mm (length) size bolts at a maximum of 85mm (with a tolerance of ±5 mm) C/C apart with a 2 mm thick washer of 304 grade SS shall be provided. Four numbers of lifting lugs of 5mm thickness shall be provided on tank sides and two nos. on the top cover. The top cover of the CTPT unit shall be welded with Four nos. of clamps fabricated from MS flat of 4mm x 35mm size after assembly. The method of the same shall be explained at the time of inspection of the Proto unit by MGVCL.

7.3 One no. of oil level gauge shall be provided at the tank to check oil level in the tank. Position and size of the oil level gauge shall be such that, the total windings and core shall be remain inside the oil, even if the oil level is at low oil level marking of gauge. The bottom-most part of the Oil level indicator should be positioned above the top most of the winding and core such that it can be ensured that the winding is totally filled up with the oil.

7.4 Pressure Release Valve of suitable size and capacity is to be provided on the tank to release pressure generated due to any abnormalities within in the CTPT unit. The supplier must ensure that PRV shall be operated in case of development of abnormal pressure within the CTPT tank .

7.5 Leakage Test :- One CT-PT set of each rating in each offered lot should be subjected to 'Leak Test' through Nitrogen gas for a pressure of 10 PSI (Pound sq. inch) for half an hour and pressure shall not drop more than 2 PSI. There should be no leakage observed at any part of CT-PT set. The same shall be verified during acceptance testing at suppliers premise.

Note: - No inspection cover/window on any side/face of the CTPT top or base shall be provided.

08 TERMINAL BOX:

8.1 The terminal box shall be closed box type, water/vermin proof with tinned copper terminals of a minimum of 6mm dia x 35mm with electroplated spring washers and three numbers nuts.

8.2 The terminal marking and polarity marking shall be done by etched aluminum square plated duly fixed in an irremovable manner.

8.3 The terminal box shall have a cable entry hole exactly appropriate to accommodate a 25 mm size brass gland suitable for the termination of 10 cores, 2.5 Sq. mm PVC insulated steel armored cable.

8.4 The terminal box covers shall have the provision of sealing the terminal box for which a minimum of four nos. of corner bolts to be fixed on the flange of the box shall be provided with an adequate hole on the bottom for sealing purposes.

8.5 All the Four holes should precisely match with each other so that nut bolt mounting can be made properly. It should have an overlapping of min 20 mm on the box at the top and both sides to restrict water entry and proper fitting of the secondary cover.

8.6 synthetic rubberized cork as per type-c as per IS 4253 (Part-2). a minimum 5mm thickness shall be provided for proper fitting of the terminal box . The oil gasket for the secondary terminals shall be such that during the operation and within the guarantee period, the oil shall not be leak from the gaskets and also they shall not break.

8.7 The terminal box with the cover closed and cable in position must have degree of protection conforming to IP-54. The minimum projection of the box shall be 70mm.

8.8 The 4 (Four) Nos. of Clamps fabricated from MS flat of appropriate shape of 2.5mm x 15mm size welded on each side of CTPT unit.

8.9 The Serial number, ratio, and date of dispatch shall have to be Laser ENGRAVED on a separate metal plate and to be fixed on side (opposite to secondary terminal box), of the tank with letter of 1mm depth, height of

30mm and Calibri fonts filled with RED color. This is required to have the reading of specified details by standing at ground level.

- 8.10** The fabrication of the CTPT set tank shall be such that there should not be any oil leakage from welded positions as well as from the secondary terminals inside the Terminal Box. The four numbers corner bolts of top cover shall have a suitable hole for inserting the sealing wire.

09 FITTING AND ACCESSORIES:

The following fittings/accessories are to be provided to the CTPT units.

(a)	Oil level gauge	01 Nos.
(b)	Nut-bolt with washer and lug should be provided as a MS earthing terminals –with; non-removable earthing symbol etched on aluminum plate.	02 Nos.
(c)	Rating and terminal marking plate (Etched All) riveted to tank.(The rating plate shall have all details as per IS 16227 (Part - I to IV) along with order no. of MGVCL and connection diagram).	01 Nos.
(d)	Lifting lugs (Minimum 5mm thick)	02 Nos. on top cover
		04 Nos. on tank side
(e)	Base MS mounting channel with Galvanized iron of minimum 50 micron 75 x 40 x 6mm having the length of 410 mm shall be provided and edge-to-edge distance between two holes (oblong shape with length–50mm) shall be kept 380 mm and same shall be fixed in such a way that 40 mm size of the channel shall be welded with tank bottom and open sides of both the channel shall remain outside.	02 Nos.
(f)	Oil filling hole with cap on tank cover	01 Nos.
(g)	I) HV porcelain bushings of approved make as per Annexure-I. If supplier wants to use any other make bushing, then it should be got approved from MGVCL before use and it should be clearly indicated in Annexure-I-B. <u>Following other make of HT bushings shall be approved as stated in list mentioned hereunder.</u>	06 Nos.
		10 Nos.
		06 Nos.
		06 Nos.
		06 Nos.
		06 Nos.

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	6	PRIME INSULATOR	
	7	GENESIS ENTERPRISES PRIVATE LIMITED	
	8	M/S SURAJ CERAMICS INDUSTRIES, BIKANER, RAJASTHAN	
	9	M/S GUJRART HEAVY ELECTRICAL & INSULATORS PVT LTD, SURENDRANAGAR	
	<p>HV Porcelain bushing should be fixed with Anti-theft stainless steel fasteners with breakaway nut at least with two sides i.e. at least two in each HV Bushing.</p> <p>II) LV terminals (Minimum 6mm dia) tinned copper with spring washer, plain washer and nuts with phase and polarity marking etched plated.</p> <p>III) HV Tinned Copper stud/bushing rod of M12 for CTPT below 75/5 Amp and M20 for CTPT of 75/5 Amp and above rating with spring washer, plain washer and nuts The usable part of the bushing rod shall be at least 50 mm for proper termination after accommodating bushing cap.</p>		
(h)	Double Compression – Flame Proof brass Gland of 25 mm dia. as per IS 12943 with ISI marking.		01 Nos.
(i)	Pressure Release Valve should be mounted on top cover with extended portion of min. 25 mm to prevent ingress of moisture and with suitable design to release accidently generated pressure in CTPT unit.		01 Nos.

010 CORE:

10.1 CORE MATERIALS:

Non aging oxide film coated fresh suitable Mu-metal or Mu-metal plus CRGO toroidal cores for CT. For lamination of PT first quality shall be used as core material. **CRGO Stampings/ laminations/ cores of 11KV CTPT Unit (with winding/ without winding) shall be made from BIS Standard marked Grain Oriented Electrical Steel Sheet and strip conforming to IS 3024:2015.** All the stresses developed due to cuttings, punching etc. shall be relieved by suitable stress relieving process.

10.2 CORE CONSTRUCTION AND DESIGN:

Core is supporting steel and insulation shall be such that harmful changes in electrical and physical properties shall not occur during the life time of the CTPT unit.

Core winding shall be strongly braced so that it shall not get displaced in operation due to shrinkage on short circuit forces. Core assembly shall be rigidly clamped with M.S. Channel and mounted to the tank

10.3 CORE OF PT:

The core of PT shall be effectively earthed by copper braided flexible wire of minimum area of 40 mm² section. The core shall be rigidly branched with insulated bolts and the assembly shall be rigidly clamped with MS Channels and mounted on the tank.

10.4 CORE OF CT:

The Tenderer shall provide toroidal core only. It should be same as given in type tested unit.

Core / Winding assembly of CT shall be rigidly mounted in the tank.

011 WINDING:

11.1 PT WINDING:

It shall be of electrolytic grade copper conductor with super enameled Insulation, conforming to relevant IS. The winding design and contraction shall be such that it shall withstand impulse voltage. The details as per Guaranteed Technical Particulars shall be provided. The winding shall be preferable in two sections.

11.2 CT WINDING:

It shall be of electrolytic grade copper conductor with DPC/DCC and super enameled insulation conforming relevant IS. The winding design and construction shall be such that it shall withstand impulse voltage and short circuit currents. The winding shall be provided with rigid insulating supporting hylum sheets of minimum 3 mm thickness on both the sides duly tightened by insulating fasteners only and by cotton cord etc.

- (a) Each coil shall be wound of paper insulated, continuously, smooth high grade, electric copper conductor.
- (b) The materials used in the insulation and assembly of the winding shall be in-soluble, non-catalytic and chemically in active in the transformer oil.
- (c) Winding assembling shall be dried in vacuum thoroughly shrunk to final alignment and vacuum impregnated with tested transformer oil.
- (d) Design arrangement, insulated and assembly of the winding on the core shall be so as to ensure uniform distribution of voltage amongst all coils.

012 CONNECTIONS:

No joints in the primary winding of CT shall be acceptable. The connections to bushing terminals shall be with flexible copper strip / rope of adequate current carrying capacity. The leads shall be properly terminated with a crimped lug only.

013 ASSEMBLY:

Three phase CTPT combined units having specification / construction as referred above shall be rigidly fixed in the tank.

The core and coil assembly shall be supported rigidly with suitable M.S. Channels. Suitable guides shall be provided to avoid displacement of active parts.

The inner clearance between live parts to tank shall be minimum 40mm for 11KV CTPT set. The drawings shall clearly indicate the inner clearance in detail. General Arrangement Drawing should be sent with offer for approval.

014 DRAWINGS:

The detailed dimensional drawings: 3copies as listed below shall be furnished along with the offer.

- (a) Overall General arrangement drawing showing bushings arrangement with their clearance, terminal box, etc. as per design shown with front side and top views along with list of fittings, material and its composition, nos., make and electrical clearance and creep age distance etc.

- (b) Drawing showing internal exposition of CT's and PT's inside tank with cross sectional view of CTs and PT, with dimensions, clearances, mounting arrangement details including details of electric and magnetic circuits. The inner clearance between live parts to the tank shall be shown in the drawing.

- (c) Diagram showing LT terminal arrangement with phase/ polarity marking and clearances. Minimum clearance (i) between LT terminals of PT should be 50 mm, (ii) From side and upper wall to terminals should be 25 mm and (iii) From bottom wall to terminals should be 85 mm.

- (d) Drawing of nameplate with minimum dimension 200 x 150 mm showing details of CT and PT ratings & details, insulation class, minimum oil quantity, Total weight, the month of supply, Guarantee period in years, etc., wiring diagram with terminal/polarity marking. The marking for primary side of PT shall be RYB while in secondary terminal marking shall be ryb & n.

015 TESTS & INSPECTION:

15.1 QUALIFICATION:

The tenderer shall have to furnish to following test certificates and documents.

- 1. All type tests certificates as listed under Annexure-II for 11KV carried out on ONE single sample unit having the class of accuracy– 0.5S, 5 VA for CT

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and on PT having Class of accuracy – 0.5, 10 VA per phase for PT and tests must not be carried out more than seven years prior to the date of submission of the tender offer. The above test should be carried out in any approved NABL Lab. Type test of CT-PT combined unit as per IS 16227 Part-4 on single CT-PT unit.

2. The tenderer shall also submit one type test certificate for the test of “Instrument Security Factor” as per the Cl. No. **7.5.2 of IS 16227 (Part-II): 2016 Amended up to date** conducted on all phases of the CTs for the sample of 10/5 Amp. of 11KV. The value of ISF must be 5 or less than 5 and the test must have been conducted at any approved NABL Lab not prior to more than seven years from the date of submission of the tender offer.
3. The copy/ proof of bill/ invoice of purchase of core material.
4. The copy of the BH curve for the core material is intended to be used in the regular supply of CTPT units.

If the above test certificates/ documents are not submitted, the offer will not be considered as “Qualified”.

15.2 TYPE TEST CERTIFICATE:

15.2.1 The supplier has to submit notarized Test Certificates for all the Type Tests as prescribed under Annexure-II for 11KV CTPT sets with the ratio as specified under 16.1 above i.e. 10/5 Amp. for 11KV class of supply voltage from any approved NABL Lab. All the Type Tests should not be older than seven years. All type tests should be carried out on a single CTPT unit.

15.2.2 The MGVCL also reserves the right to carry out all or any type tests on any CTPT set from the lot offered for inspection/supplied lot by the firm at any approved NABL Lab in presence of MGVCL officers and representative of the firm at MGVCL’s cost. Any decision based on this testing shall be applied to the full ordered quantity. However, if the unit fails in the test, then the test charges shall have to be borne by the supplier.

15.3 ACCEPTANCE TESTS:

15.3.1 The tests shall be carried out at the manufacturer’s work as “Acceptance Tests” on all CTPT sets offered for inspections as per applicable IS of individual units and this specification as per Annexure-III.

15.3.2 If required, the inspector of MGVCL shall open check any one or more CT PT units from offered lot to verify winding wire and conductor size, core size, oil quantity, and inside design as per MGVCL specification and supplier’s offered design. If any deviation will be observed, the entire lot shall be rejected.

15.3.3 Material must be “Ready to Dispatch in all respect (i.e the final name plate, U clamp welding, and Engraved name plate)” at the time of acceptance test.

15.4 ROUTINE TESTS:

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The firm shall carry out the routine tests on each CTPT set being offered for inspection and submit the routine test certificates along with an inspection call in the form of CD/DVD/Pendrive. Routine tests shall be carried out as per Annexure-IV.

The MGVCL shall carry out Routine tests, as per Annexure-IV, on all dispatched CTPT units at MGVCL's Hi-tech/ any approved NABL Lab. If any CTPT unit does not conform routine tests at the HI-tech/ any approved NABL Lab, the supplier shall have to collect and return after repaired/ replaced at free of cost within 30 days from the date of information to the supplier.

016 PROTOTYPE UNITS:

- 16.1** The successful tenderer shall have to obtain approval of requisite drawings and then prepare prototype unit of the lowest ratio specified in order for 11KV separately conforming to this specification prior to manufacturing of bulk supply.
- 16.2** All Acceptance Tests shall be carried out on the prototype unit as per Annexure-III of this specification and temperature rise test at the firm's work
- 16.3** Total harmonic distortion on secondary side with respect to primary side in 11 KV PT shall not be more than + 2.0%.
- 16.4** Ph to Neutral accuracy of PT shall be within the relevant accuracy class.
- 16.5** However, if required, DISCOM reserves rights to carry out all **acceptance/type** tests including the test of ISF on proto-type units, as per Annexure-II at any approved NABL Lab(the name of the laboratory shall be decided by MGVCL) in the presence of MGVCL's representative.
- 16.6** The cost of all **acceptance/type** testing and its related expenses shall have to be borne by the supplier.
- 16.7** All dimensions, constructional features, and other requirements outside and inside of the CTPT unit laid down in specification shall also be checked during proto-type inspection.
- 16.8** After completion of successful testing, the prototype units shall be sealed and kept at the firm's premises. During a subsequent inspection of the CTPT set, any unit will be opened for comparison with the prototype for internal design detail, if required.
- 16.9** The detailed drawings as mentioned in clause no. 15 of this tender specification be submitted by the firm along with offer and only after approval of prototype unit and detailed drawings, the firm shall start bulk supply conforming to approved proto type units.
- 16.10** The prototype units shall be dispatched along with last lot only after welding of clamp between top cover and Body of the CTPT Unit.
- 16.11** The successful bidder shall first offer PROTO unit for **stage inspection**. During stage inspection all the raw material and manufacturing process shall be verified. On clearance of stage inspection bidder shall process for manufacturing of PROTO/Lot unit and offer the same for inspection.

017 GUARANTEE:

- 17.1** The combined CTPT set offered shall have a guarantee for good design, Materials, and workmanship. The defective units shall have to be repaired/replaced free of cost if reported within 66 months from the date of dispatch or 60 months from the date of commissioning whichever is earlier. The firm shall be responsible for the proper performance of the equipment for 66 months from the date of dispatch or 60 months after commissioning whichever is earlier.
- 17.2** Reported failed units under the guarantee period as above shall be repaired/replaced as early as possible. In any case, it should be repaired/replaced within 30 days. The failed units are to be collected by the supplier from our field offices within 15 days of reporting. If an immediate arrangement for the collection of the failed units are not done by the Supplier and if the units are not repaired and returned within two months time, the MGVCL will deduct the full cost of the CTPT unit from the bill.
- 17.3** The MGVCL reserves rights to test/check any/all CTPT units from supplied lot during its guarantee period at MGVCL's own laboratory OR any other approved NABL Lab for conformance of IS 16227 (Part - I to IV) and technical specifications of MGVCL. Failing of any CTPT unit in the above test, the supplier shall have to repair/replace CTPT units within 30 days from intimation by the MGVCL and if fails to supply within specified period then suitable penalty shall be imposed and recovered from date of intimation as per commercial T&C
- 17.4** The supplier situated outside Gujarat State shall have to establish a suitable and adequate arrangement for repairing and testing of failed CTPT in Gujarat State at his cost. This arrangement shall have to be continued up to the completion date of the guarantee period of supply of the last lot.
- 17.5** The testing of each GP failed CTPT unit will be carried out for all acceptance tests as per relevant standards at the supplier's work free of cost before returning to the store of the DISCOM.
- 17.6** The successful bidder shall have to submit the declaration on the company letterhead regarding the utilization of bought-out raw materials conforming to relevant IS/IEC and applicable rules & regulations with the latest amendments during the inspection as per the format attached as Annexure-III.

ANNEXURE: I : 11 KV CTPT

SUB: GUARANTEED TECHNICAL PARTICULARS FOR 11 KV CTPT SETS:

Sr. No.	DESCRIPTION	MGVCL'S REQUIREMENTS	TO BE OFFERED BY BIDDER
1	2	3	4
1	Type	Paper insulated, oil cooled, outdoor type	
2	Potential Transformer		
	a) Nos. of PTs	One Three Phase star/star PT	
	b) Rated voltage	11 KV	
	c) Type	Paper insulated, oil cooled, outdoor type	
	d) Vector group	Star / Star	
	e) PT Ratio	11 KV / 110 Volts	
	f) PT burden/phase	10 VA at 0.8 PF (lag)	
	g) Accuracy class	0.5	
	h) Applicable Standard	IS 16227 (Part-I to IV)	
	i) Rated Voltage factor & time	1.2 times continuous, 1.5 times for 30 seconds	
	j) One minute power frequency dry withstand test for		
	1) Primary winding	28 KV (rms)	
	2) Secondary winding	3 KV (rms)	
	k) Impulse withstand test volt	75 KV (Peak)	
	l) Core clamping arrangement	MS channel with rigid fixing	
	m) Insulation Class	A	
	n) Ue (As per 6.13.402.2 of IS 16227-IV)		
3	Current Transformer	Single ratio	
	a) Nos. of CTs	Three Single Phase CTs	
	b) Type	Paper insulated, oil cooled, outdoor type	
	c) CT ratio	As per Cl. No. 4(d)& (e)	
	d) CT burden/phase	5 VA at 0.8 PF (lag)	
	e) Accuracy Class	0.5S	
	f) Applicable standard	IS 16227 (Part-I to IV)	
	g) Short Time Current		
	01) Thermal Rating a.for each offered rating	Upto and including 50/5 :- 6.4 KA for 1 sec >50/5 Upto and including 100/5 :- 13.1 KA for 1 sec >100/5 Upto and including 250/5 :- 18.4 KA for 1 sec	

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Date:

Place:

	02) Dynamic Rating	2.5 times Ith	
	h) One minute Power Frequency Dry withstand test		
	01) Primary Winding	28 KV (rms)	
	02) Secondary Winding	3 KV (rms)	
	i) Impulse Withstand test	75 KV (Peak)	
	j) a) Current density at STC for 1 second (max)	165 Amp./mm ²	
	b) Current density at rated current (maximum)	1.5 Amp./mm ²	
	k) Type of Core	Toroidal	
	l) Core material	CRGO/Mu-metal	
	m) Core Clamping Arrangement	With bakelite sheet	
	n) Insulation Class	A	
	o) Instrument Security Factor	5 or less than 5	
4	Fitting and Mounting		
	a) Earthing terminals	2 Number (1.5" X 0.5")	
	b) Oil filling hole with plug	1 Number (1/2" Plug)	
	c) Oil level gauge	1 Number	
	d) HV Bushing		
	Number	6 Number	
	Make	Bhel/Luster Ceramic/Jayshree/ WS/BPPL Bikner/Agrawal salt Co Bikaner/Venkateshwara Ceramics – Warangal/BEP Co/Associate Procelain/Jaipur Glass/CJI Porcelain/Seshasayee/Max Well (11KV)/Ravi Kiran (11KV) Insulator	
	Metal Parts	Each HT Stud (M12: below 75/5 Amp and M20: 75/5 Amp and above ratings), Duly Tinned Copper with 3 Nos. of Nuts, 2 Nos. of plate washers, 1 Nos. of spring washer and Aluminum lug (95 mm ² : below 75/5 Amp and 120 mm ² : 75/5 Amp and above ratings) (Total 6 Nos. of HT Studs and 6 Nos. of Aluminum lugs)	
	Applicable Standard	IS 3347	
	Creepage Distance	As per IS 3347	
	e) Lifting lugs		
	On top cover	2 Number	

Signature of Tenderer Company's Round Seal Date:

Place:

	On side	4 Number	
	f) Lifting lug thickness	5 mm	
	g) Rating and terminal marking	1 Number	
	h) Polarity Marking	1 Number	
	i) Size of LT terminal	6.0 mm dia & 35 mm long	
	j) LT terminal material	Tined Copper	
	k) Bolts, Nuts, Washer		
	1) Grade of Bolts	SS 304	
	2) Size of Bolts	M 12x35mm length	
	3) Center to Center distance between adjacent bolts	85 ± 5 mm	
	4) Grade of Washer	SS 304 Grade	
	5) Minimum thickness	2 mm	
	6) Gasket (minimum 5mm) <ul style="list-style-type: none"> • For Bushing (6 mm) • For tank (5mm) • For Secondary terminal box (5mm) 	Neoprene/Nitral/Synthatic Rubber Cork	
	l) Double Compression Flame Proof brass Gland of 25mm dia. as per IS 12943 with ISI marking	1 No.	
	m) MS flat clamps of 2.5mm by 15mm for welding of terminal cover at site as referred under Cl. No. 7.1	4 Nos.	
	n) MS flat clamps of 4mm by 35mm size for welding of top cover at works	4 Nos.	
5	GASKET used in CTPT unit is type tested as per IS 11149 / IS 4253 (Part-2) ? (YES/No)	Yes	

Signature of the Supplier

Signature of Tenderer Company's Round Seal

Date:

Place:

ANNEXURE: I-A : 11KV CTPT

Sub: Technical Design parameters for 11 KV CTPT set.

Sr. No.	Description	Offered by supplier
1	PT HV winding (a) HV conductor size (b) Nos. of coil per phase (c) Nos. of Turns per phase	
2	PT LV Winding (a) LV conductor size (b) Nos. of Turns per phase	
3	PT Core (a) Core Characteristic as per core material supplier's data i.e. BH curve (Please enclose curve) (b) Cross section of area of core	
4	C.T. (a) Instrument security factor (ISF) (b) CT primary conductor size (c) Nos. of turns of Primary Winding (d) CT secondary conductor size (e) Nos. of turns of secondary winding (f) Nos. of parallel paths used in secondary winding	
5	Qty. of first filling of transformer oil	
6	Tank (a) Tank sheet size (i) Top and bottom thickness (ii) Side wall thickness (b) Tank Size (i) Overall Dimension (ii) Inside Dimension	

N.B. Please offer Technical Particulars in this sheet only.

Signature of Supplier

Signature of Tenderer Company's Round Seal

Date:

Place:

ANNEXURE: I-B : 11 KV CTPT

Sub: Deviation in offer for 11KV CTPT Sets.

Sr. No.	Descriptions	MGVCL's requirement	Deviated parameter	Reasons for deviation
01	02	03	04	05

Signature of Supplier

N.B. Please offer deviation from technical particulars in this sheet only. If there is no deviation, please indicate clearly in this Annexure that our offer have no deviation from Technical Specification of this tender.

ANNEXURE – II (Type Tests)

Signature of Tenderer Company's Round Seal Date: Place:

Schedule of Type Test for CT-PT combine unit as per clause No. 7.2 and in accordance with IS 16227 (Part 4)

- 01 Verification of Markings** [IS 16227(Part-4), CL No.7.3.6]
- 02 Temperature Rise Test** [IS 16227 (Part-4), CL No.7.2.2]
- 03 Impulse voltage test on primary terminals** [IS 16227 (Part-4), CL No.7.2.3]
- 04 Wet test for outdoor type transformers** [IS 16227 (Part-4), CL No.7.2.4]
- 05 Tests for accuracy** [IS 16227 (Part-4), Cl. No. 7.2.6]
- 06 Verification of the degree of protection by enclosure** [IS 16227 (Part-4), Cl. No.:7.2.7]
- 07 Enclosure tightness test at an ambient temperature** [IS 16227 (Part-4), Cl. No.: 7.2.8]
- 08 Pressure test for the enclosure** [IS 16227 (Part-4), Cl. No. 7.2.9]
- 09 Short time current tests** [IS 16227 (Part-4), Cl.No. 7.2.201]
- 10 Short circuit withstand capability tests** [IS 16227 (Part-4), Cl. No. 7.2.301]
- 11 Partial Discharge Measurement test** [IS 16227 (Part-4), Clause No. 7.3.2]
- 12 Instrument Security Factor Test for Current transformer** (Determination of the instrument security factor (FS) [IS 16227 (Part-4), Clause No. 7.5.2]
- 13 Interturn Overvoltage Test** [IS 16227(Part-4), CL No.7.3.204]
- 14 Power frequency voltage withstand test on primary wterminals.** [IS 16227 (Part-4) CL No.7.3.1]
- 15 Power frequency voltage withstand test on secondary terminals.** [IS 16227 (Part-4) CL No.7.3.4]

ANNEXURE – III (Routine Tests)

Signature of Tenderer Company's Round Seal Date: Place:

Schedule of Routine Test for CT-PT combine unit as per clause No. 7.3 and in accordance with IS 16227 (Part 4)

1. **Power frequency voltage withstand test on primary wterminals.** [IS 16227 (Part-4) CL No.7.3.1]
2. **Power frequency voltage withstand test on secondary terminals.** [IS 16227 (Part-4) CL No.7.3.4]
3. **Partial Discharge test** [IS 16227 (Part-4), CL No.7.3.2]
4. **Tests for accuracy** [IS 16227 (Part-4), Cl. No. 7.3.5]
5. **Verification of Markings** [IS 16227(Part-4), CL No.7.3.6]
6. **Enclosure tightness test at an ambient temperature** [IS 16227 (Part-4), Clause No.: 7.3.7]
7. **Pressure test/leakage test for the enclosure** as per cl. No. ____ of this technical specifications.
8. **Determiation of the secondary winding resistance** [IS 16227(Part-4) CL No.7.3.201]
9. **Interturn Overvoltage Test** [IS 16227(Part-4), CL No.7.3.204]
10. **Instrument Security Factor Test for Current transformer** (Determiation of the instrument security factor (FS) [IS 16227 (Part-4), Clause No. 7.5.2]

Additionally following routine tests shall be carried out on all CTPT units considering special requirement of purchasure.

- 1 Total harmonic distortion in 11 KV PT shall not be more than + 2.0% THD with respect to primary side.
- 2 Ph to Neutral accuracy of PT shall be within the relevant accuracy class.

ANNEXURE – IV (Acceptance Tests)

Schedule of Acceptance Test for CTPT as per Clause No. 16.2 and in accordance with IS 16227 (Part 1 to 4)

- 1. Dielectric strength of oil (BDV test) as per IS-335**
- 2. Temperature Rise Test [IS 16227 (Part-4), CL No.7.2.2]**
- 3. Power frequency voltage withstand test on primary terminals. [IS 16227 (Part-4) CL No.7.3.1]**
- 4. Power frequency voltage withstand test on secondary terminals. [IS 16227 (Part-4) CL No.7.3.4]**
- 5. Partial Discharge test [IS 16227 (Part-4), CL No.7.3.2]**
- 6. Tests for accuracy [IS 16227 (Part-4), Cl. No. 7.3.5]**
- 7. Verification of Markings [IS 16227(Part-4), CL No.7.3.6]**
- 8. Enclosure tightness test at an ambient temperature [IS 16227 (Part-4), Clause No.: 7.3.7]**
- 9. Pressure test/leakage test for the enclosure as per cl. No. ____ of this technical specifications.**
- 10. Determination of the secondary winding resistance [IS 16227(Part-4) CL No.7.3.201]**
- 11. Interturn Overvoltage Test [IS 16227(Part-4), CL No.7.3.204]**
- 12. Instrument Security Factor Test for Current transformer (Determination of the instrument security factor (FS) [IS 16227 (Part-4), Clause No. 7.5.2]**
- 13. Physical verification test to confirm requirements of technical specifications & relevant standards.**

Additionally following acceptance tests shall be carried out on CTPT units considering special requirement of purchasure.

- 1 Total harmonic distortion in 11 KV PT shall not be more than + 2.0% THD with respect to primary side.
- 2 Ph to Neutral accuracy of PT shall be within the relevant accuracy class.
- 3 Verification of oil quantity as per bidder's offer

Annexure-V
(ON COMPANY LETTER HEAD)

DECLARATION REGARDING UTILIZATION OF BOUGHT OUT RAW MATERIALS CONFORMING TO RELEVANT IS/IEC AND APPLICABLE RULES & REGULATIONS WITH LATEST AMENDMENTS

Reference:

- (1) Master LOA no. _____
- (2) DISCOM LOA no. _____
- (3) AT no. _____
- (4) Supplier inspection call letter no. _____

In connection with the above subject and reference I/ We declare & undertake the following.

I / We, _____ the under signed & authorized signatory of the Company have confirmed the technical specification & GTP of the tender no. _____ in all respect during tender process.

Accordingly, I / We hereby declare & undertake that all the bought out raw materials which are utilized in the manufacturing of the distribution transformers supplied against AT and inspection call mentioned under references are conforming to relevant IS/IEC and applicable rules & regulations with latest amendments.

I / We, declare that our supplied material is strictly in line with the tender technical specifications and GTP requirements.

Signature of the Authorised Signatory of the Supplier Seal of the Supplier

Name:

Designation:

Date:

Name of Supplier:

Address of works at which inspection conducted: