WEST BENGAL STATE ELECTRICITY

DISTRIBUTION COMPANY LIMITED

(A Govt. of West Bengal Enterprise)

Office of the Material Controller
Central Stores & Purchase Department
4th Floor : Vidyut Bhaban : Bidhannagar
Kolkata – 700 091

TECHNICAL SPECIFICATION

FOR

TECHNICAL SPECIFICATION FOR 33 KV 1 PHASE DUAL CORE, OUTDOOR TYPE, POTENTIAL TRANSFORMER

TECHNICAL SPECIFICATION FOR 33 KV 1 PHASE DUAL CORE, OUTDOOR TYPE, POTENTIAL TRANSFORMER

1.00 SCOPE :

1.1 This Specification covers the design, manufacture, assembly, testing at Manufacturer's Works, supply and delivery at site of Potential Transformers in three phase system of 33 KV Class.

1.2 These Potential Transformers will be used as Bus-side P.T. for voltage indication by voltmeter through selector switch and supply of voltage to meters, high speed distance relays, directional relays etc. for feeder protection and synchronisation devices.

2.00 STANDARDS :

The Potential Transformers and accessories covered by this specification shall comply with the requirement of the latest edition of the following standards unless otherwise stated in this specification :

IS : 3156 Part (I-IV)	:	Specification for Voltage Transformer.
IS: 4146	:	Application guide for Voltage Transformers.
IS: 2099 / IS : 5621	:	Specification for Bushings for alternating voltages above 1000 Volts.
IS: 335	:	Specification for Insulating Oil.
IS : 3024	:	Specification for Core Materials.
IEC:60044-2	:	Specification for Voltage Transformer.

3.00 DEVIATION :

Normally the offer should be as per Technical Specification without any deviation. But any deviation felt necessary to improve performance, efficiency and utility of equipment must be mentioned in the Deviation Schedule with reasons duly supported by documentary evidence. Such deviations suggested may or may not be accepted by the WBSEDCL.

4.00 DESIGN & CONSTRUCTION OF POTENTIAL TRANSFORMERS :

The design features and construction details of Potential Transformers shall be in accordance with the requirement stipulated hereunder :

i) The Potential Transformers shall be complete in all respects and shall conform to the modern practice of design and manufacture.

ii) The Potential Transformers shall be electromagnetic, outdoor type, single phase, oil filled, self cooled, having shaded porcelain bushing as per IS: 2099, **OR** Dry Type outdoor PT, suitable for operation under the service conditions without protection from sun, rain and dust.

iii) The maximum temperature rise at 1.1 times rated primary voltages, rated frequency and rated burden, shall not exceed the following values over the above stated maximum ambient temperature.

	Class of Insulation	Maximum Temp. Rise ^{0}C
a)	For winding with class A Insulation immersed in oil (Measured by Resistance Method)	50^{0}C
b)	Oil at the top of the Tank (Measured by Thermometer)	40^{0}C
c)	With 1.5 times rated voltage for 30 seconds	10^{0}C more than above value after continuous application of 1.1 times rated voltage.

	d)	Maximum ambient temp. to be considered.	50^0C
	e)	**For Dry Type**	55^0C above ambient of 50^0C
	iv)	The Potential Transformer shall be capable to withstand line discharge effect and also the ferro resonance effect.	
	v)	The Potential Transformers shall be suitable for up right mounting on steel structures. Necessary flanges, bolts, clamps fittings etc. for base of P.T. are within the scope of the supplier to match with WBSEDCL's standard base structure Drawing as specified below : K.V. Fixing Centre to Center 'X' direction Fixing Center to Center 'Y' direction 33 330 mm 330 mm.	
	vi)	The P.T. shall be complete with all accessories like Primary Terminals, Terminal Connectors, suitable for ACSR 'DOG' weather proof Terminal Box for secondary connection, lifting lugs, grounding terminals, oil sight glass, pressure release device, filling and draining plugs and name plate.	
	vii)	Oil immersed type P.T. shall be provided with class A insulation and Dry type shall have minimum class A insulation or better. Oil immersed type P.T shall be of hermetically sealed type construction to prevent air & moisture from entering the tank.	
	viii)	The core of the PTs shall be high grade non-aging, silicon laminated steel of low hysteresis loss and high permeability to ensure high accuracy at both normal and over voltages conforming to IS:3024.	
	ix)	PT Characteristics shall be such as to provide satisfactory performance for burdens ranging from at least 25% to 100% of rated burden over a range of at least 5% to 110% rated voltage in case of protective cores and a voltage range of 80% to 120% (0.8 pf lagging) in case of measuring cores.	
	x)	The P.T. secondary terminals shall be brought out through fuse of suitable rating in a weather proof terminal box for easy access.	
	xi)	ο For Dry type outdoor Potential Transformer, the contractor shall ensure that single phase PT shall be replaceable by oil filled PT. PT stud/ connection point should be of adequate size for suitable connection. Suitable terminal connector for connection of ACSR Dog with terminal pad should be provided also. Material of connector stud should be brass/ Copper.	
5.00	**BUSHING (applicable for oil immersed type) :**		
	i)	Shaded porcelain bushing conforming to latest edition of IS:5621 & IS:8603 shall be used for P.T.	
	ii)	Cast metal end caps for the bushings shall be of high strength, & made of brass. They shall have smooth surface to prevent discharge taking place between the metal parts and porcelain as a result of ionisation.	
	iii)	The insulation of bushing shall be co-ordinated with that of the potential transformer such that the flashover, if any will occur only external to the PT.	
	iv)	Each of the bushing cap / head shall be complete with the following features : Primary terminals suitable for connection through Rigid Connectors for ACSR Conductors/Flexible Connector for Pipe Bus as specified under technical parameters.	

	v)	Oil level gauge and convenient means of oil and nitrogen filling, sampling and draining of oil is to be provided in Tank.
5.01		In case of dry type PT , provision of bushing is not applicable. However in that case PT should have proper creepage distance.
6.00	**INSULATING OIL (applicable for oil immersed type):**	
	The quantity of insulating oil for filling of complete unit shall be stated. The oil shall comply in all respect with the provisions of the latest edition of IS: 335.	
7.00	**GROUNDING TERMINALS :**	
	Two grounding terminals on diagonally opposite sides of adequate size suitable for connecting M.S. Flat of size 50 mm. x 6 mm. shall be provided. HV Neutral Terminal earthing and body earthing should be marked distinctly and be physically well separated. The terminal of high voltage winding intended to be earthed shall be brought out through a bushing, insulated from case or frame to be earthed by a separate arrangement (through Link).	
8.00	**TERMINAL CONNECTORS :**	
	i)	All castings of connectors shall be free from holes, surface blisters, cracks and cavities. All sharp edges or corners shall be rounded off.
	ii)	No part of the connectors shall be less than 10 mm. thick.
	iii)	All ferrous parts shall be hot dip galvanised conforming to IS:2633
	iv)	Bimetallic strips and sleeves, if required, shall be provided of about 2 mm. thickness as a part of connector.
	v)	Rigid connectors shall be made from Aluminium Alloy.
	vi)	All current carrying parts of the connectors shall have minimum contact resistance.
	vii)	Connectors shall conform to type test as well as to routine test as per IS:5561.
	vii)	Connectors shall be suitable for connection with ACSR 'DOG' to CT terminal along with suitable nuts bolts & washers.
9.00	**SECONDARY TERMINAL BOX :**	
	i)	All secondary terminals shall be brought out in a compartment on one side of each potential transformer.
	ii)	The exterior of this terminal box shall be hot dip galvanised/weather proof paints as mentioned against Item No. 10 below.
	iii)	The terminal box shall be provided with removable cable gland plates at bottom for mounting cable glands suitable for 1.1 KV grade steel wire armoured, PVC insulated, PVC sheathed 3C x 2.5 sq.mm. stranded copper conductor cables. The cable glands shall be included within the scope of supply. 20 mm dia holes to be arranged for each core in detachable gland plate.

	iv)	The terminal box shall be provided with a cover in front so as to have easy access of secondary terminals. The cover shall have a sealing/locking arrangement and shall be suitable to prevent ingress of moisture and rain water. Cover shall be provided with braided copper wire connecting main body with cover lid for earthing purpose especially for hinged type cover. In case of bolted type cover, braided copper wire is not mandatory. The degree of protection shall not be less than IP-55 as per IS:2147.
	v)	All terminals shall be clearly marked with identification number to facilitate connection to external wiring in accordance with relevant Indian Standards.
10.00	**PAINTING (wherever applicable) :**	
	i)	The tank and top metallic parts shall be hot-dip galvanized/painted. All steel surfaces shall be cleaned by sand blasting or chemical process as required to produce a smooth surface, free of scale, grease and dirt.
	ii)	Steel surface in contact with insulating oil shall be painted with heat resistant oil insoluble insulating varnish.
11.00	**BID DRAWING, CATALOGUE AND TEST REPORTS :**	
	One copy of the following drawings and catalogue shall be submitted with each copy of bid for evaluation :	
	i)	General arrangement drawings showing front elevation, side view, plan along with all accessories, mounting arrangement, creepage distance of the bushing, electrical diagram of primary and secondary connection with polarity marking, terminal arrangement of secondary terminal box, size of primary terminals, grounding terminals and lifting lugs, quantity of insulating oil, net and shipping weight, dimension etc.
	ii)	Name and rating plate diagram of PT.
	iii)	**Test Report:** The bidder shall submit complete test reports of all tests (including Type Test) as stipulated in Clause No. 9.1.1 & 9.1.2 of the relevant IS-3156 (Part-I)-1992 with Complete identification, date and serial no., carried out in CPRI/ NABL accredited/ Government recognized Test House or Laboratory on Potential Transformer of identical Type and Rating **COPIES OF FOLLOWING TYPE TEST REPORT AS PER LATEST IS/IEC, CARRIED OUT WITHIN FIVE (5) YEARS, FROM DUE DATE OF TENDER, FROM CPRI, NABL ACCREDITED/ GOVERNMENT RECOGNISED TEST HOUSE OR LABORATORY SHALL BE SUBMITTED ALONG WITH TENDER DOCUMENTS AS PRE- REQUISITES. FAILING WHICH THEIR OFFER MAY NOT BE TECHNICALLY ACCEPTABLE.** **a) Temperature rise test** **b) Lightning Impulse Voltage Test** **c) Power frequency wet withstand voltage test** **d) Partial discharge test (Routine Test, mandatory for dry type above 7.2KV, as per IS)** **(e) Determination of error**

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	iv)	**SPECIAL TEST FOR DRY TYPE CT AS PER RELEVANT STANDARD(following Tests Reports shall have to be submitted along with Bid documents, but may be relaxed in respect of date of Carrying out of such tests, at the discretion of Tendering authority.)** a) uv accelerated ageing test. b) Water absorbtion test c) Thermal shock test d) Artificial pollution test
	v)	Each Type Test Report shall comply with the following information with Test results : i) Complete identification, date and serial no. ii) Method of application where applied, duration and interpretation of each Test.
12.00	**CONTRACT DRAWINGS AND MANUALS :**	
12.1	The supplier shall submit to the purchaser the following tender purpose drawings and manuals along with tender documents. The drawings in line with tender specification shall also to be submitted after issuance of order in six (6) copies to the Purchaser for approval.	
	i)	General outline dimension drawing of potential transformers furnishing front and side elevation, top and bottom plan, views showing all accessories, mounting arrangement on steel structures, spacing and size of the bolts, total creepage distance of bushing, electrical diagram for primary and secondary connections with polarity mark, terminal arrangement for secondary terminal box, size of primary terminals, grounding terminals and lifting lugs, quantity of insulating oil, net and shipping weight, shipping dimension etc.
	ii)	a) Name and Rating Plate Diagram of P.T. b) Rating plate shall be fixed in non detachable portion at a visible height. In the Name plate, property Label: WBSEDCL, Purchase order no & date shall be marked clearly
12.2	After approval, ten (10) sets of approved drawings and operating and maintenance manual including the instruction manual shall be submitted for our record and distribution to site. Two sets complete in all respects with required bindings should be sent directly to the Chief Engineer (P&E-Dist.), WBSEDCL, Vidyut Bhaban (2nd Floor), Kolkata- 700 091.	
12.3	INSTRUCTION MANUAL SHOULD CONTAIN :	
	i)	A brief description of P.T. furnishing the constructional features.
	ii)	Instruction for handling, storing, erection, commissioning and operation and maintenance of P.Ts.
	iii)	General outline drawing of the P.Ts along with all components and accessories.
	iv)	Marked erection points identifying the component parts of P.T.
	v)	Detailed dimensions of assembly and description of all accessories.
	vi)	Detailed views of Core, winding assembly, winding connections and its tappings.
	vii)	List of spares and other necessary information for P.Ts.
	viii)	A set of approved test certificate.

<table>
<tr><th colspan="3">TECHNICAL SPECIFICATION FOR 33 KV 1 PHASE DUAL CORE, OUTDOOR TYPE, POTENTIAL TRANSFORMER</th></tr>
<tr><td>13.00</td><td>i)</td><td><u>TESTS AT FACTORY AND TEST CERTIFICATES:</u>
Each P.T. shall comply with the requirement of routine test as specified in the relevant Part (I to III) of IS:3156 and IS:4146.</td></tr>
<tr><td></td><td>ii)</td><td>Routine test at manufacturer's works shall be carried out and Test Reports are to be submitted to WBSEDCL. and Test Reports are to be submitted to Chief Engineer, Distribution Testing Department ,WBSEDCL, Abhiksan Bldg, Salt Lake with a copy to MC,CS&PD, WBSEDCL.</td></tr>
<tr><td></td><td>iii)</td><td>All Acceptance tests shall be carried out at the manufacturer's works on every lot offered for inspection as per relevant IS. In addition to above, all routine tests are also to be carried out on Potential Transformer as per relevant IS. Selection of samples for acceptance test as well as rejection and retesting shall be guided by relevant IS. The entire cost of acceptance and routine tests that are to be carried out as per relevant IS shall be treated as included in quoted price of Potential Transformer. Four copies of test reports duly signed by the inspecting officers, shall be submitted to the Chief Engineer & Material Controller, CS&PD, Bidyut Bhavan (4th floor) Salt Lake, Kolkata -700091.</td></tr>
<tr><td></td><td>iv)</td><td>The contractor shall give at least 21(twenty one) days advance notice intimating the actual date of inspection for Routine and acceptance Test and details of all tests that are to be carried out . to be addressed to The CE, Distribution Testing Department ,WBSEDCL, Abhiksan Bldg, Salt Lake, Sector-V.</td></tr>
<tr><td>14.0</td><td colspan="2"><u>TYPE TESTS after issuance of order :</u>
Besides submission of Type test Report, carried out within five years as per tender specification, Type Test at the discretion of Ordering authority, shall have to be arranged by the successful contractor from any lot offered for inspection, sample chosen at random after successful routine test by our inspection team, as per relevant ISS from CPRI/ NABL accredited/ Government recognized Test House or Laboratory in presence of WBSEDCL'S representative.

However the necessary cost of the type test Charges will be reimbursed to the party on production of necessary supporting documents.</td></tr>
<tr><td>15.0</td><td colspan="2">Documents to be submitted at the time of physical delivery at consignee stores:

The following documents to be submitted by the vendors to the consignee, Stores at the time of despatch to stores by the vendors:-
a) Copy of Purchase order.
b) Copy of Despatch Instruction.
c) Inspection Test Certificate.
d) Guarantee Certificate .
e) Proforma Invoice.
f) Calculation Sheet for Price Variation on the basis of IEEMA etc., wherever applicable with base date of order.
g) Seal list and packing list.
h) Challan in triplicate.
i) Way bill, if applicable.</td></tr>
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SPECIFIC TECHNICAL PARAMETERS OF 33KV POTENTIAL TRANSFORMERS

Sl.No.	Description		33 KV
	Type:		
i)	Rated System Voltage KV (rms)		33
ii)	Highest System Voltage KV (rms)		36
i)	System Frequency (Hz)		50
iv)	System Neutral Earthing		Earthed through grounding Transformer
v)	Installation		Outdoor
vi)	Voltage variation		10%
vii)	Voltage Factor		1.9 times for 8 hrs 1.2 continuous
viii)	Rated insulation level		
	a)	1.2/50 microsecond impulse withstand outage KV (Peak)	170
	b)	One min. dry power frequency withstand voltage KV (rms)	3 KV
ix)	Power frequency over voltage withstand requirements for secondary winding.		3 KV
x)	Creepage Distance (Heavily polluted atmosphere) Total (mm)		900
xi)	Accuracy		PTs shall be of accuracy class 0.5 for metering and 3P for protection as per IS:3156 / IEC 186,60044-2
xii)	Ratio:		
	a)	Primary Side (KV)	33/ √ 3
	b)	Secondary Side (V)	110 / √ 3
	c)	No. of Core	2
	d) i) ii)	Core Details Rated Burden For Metering per phase (VA) For Protection per phase (VA)	 100 100

Core Details of PT

Sl.No.	Description of Core	Number of Core	Core Details of Core-I	Core Details of Core-II
1.	33000V / √ 3 / 110V / √ 3, 110V / √ 3	2	100 VA, 0.5	100 VA, 3P

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GUARANTEED TECHNICAL PARTICULARS TO BE FILLED UP BY THE TENDERER				
1.	Name of the Manufacturer			
2.a.	Address with Telephone & Fax			
2.b.	Place of Manufacture of tendered item			
3.	Type & Designation of tendered item			
4.	Rated Primary Voltage			
5.	Rated Secondary Voltage			
	a)	Winding-I		
	b)	Winding-II		
6.	Volt Factor And Duration			
7.	Rated burden And Accuracy Class			
	Core-I			
	Core-II			
8.	Temperature Rise :			
	i)	with 1.2 times rated primary volt continuously.		
	a)	by resistance method		
	b)	by thermocouple / thermometer		
9.	Rated Insulation Level :			
	a)	1.2/50 micro sec. Impulse withstand voltage on primary side		
	b)	1 min power frequency withstand voltage(dry)on primary side		
	c)	1 min power frequency withstand voltage(wet)on primary side.		
	d)	1 min power frequency withstand test voltage on secondary side.		
10.	a)	Minimum Creepage distance mm.		
	b)	Whether PT is hermetically sealed or not (for oil type PT only).		
	c)	Name of Dry Inert Gas(for oil type PT only).		
	d)	Pressure of Inert Gas(for oil type PT only).		
11.	Whether Pressure Release Valve Provided(for oil type PT only) ?			

GUARANTEED TECHNICAL PARTICULARS TO BE FILLED UP BY THE TENDERER			
12.	Characteristics :		
	Ratio & Phase angle error.		
13.	Total Weight		
14.	Weight of Oil(for oil type PT only).		
15.	Overall dimensions.		
16.	Mounting details.		
17.	Drawing & Literatures		
18.	Test Reports (Type) (Enclose List of Tests)		
19.	Deviation Sheet filled up ?		
20.	Soft copy of GTP submitted ?		
21.	List of Type Test report submitted.		
22.	Applicable standard		
23.	Supply list, Po & DI details for last 3 years		

Name

Designation

Signature