West Bengal State Electricity Distribution Company Limited

(A Govt. Of West Bengal Enterprise)

TECHNICAL SPECIFICATION OF LT RING TYPE, SINGLE PHASE SINGLE RATIO,RESIN CAST DRY TYPE CURRENT TRANSFORMERS TO BE USED IN SMC BOX FOR DTR METERING OF RATIO200/5, 400/5A

OCTOBER'2024

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Technical Specification of LT Resin Cast Dry Type, Single Phase, Single Ratio type Current Transformers for Distribution Transformer Metering.

1.0 Scope:-

1.1 This specification covers design, manufacture, assembly, testing before supply, inspection, packing and delivery and other basic technical requirements in respect of LT ring type, Resin Cast, Dry Type, Single Phase, Single Ratio type Current Transformers for DTR Metering to be installed at various site in WBSEDCL. The Current Transformers for Metering to be supplied against this specification are required for vital installations where continuity of service is very important. The design, materials and manufacture of the Current Transformers shall, therefore, be of the highest order to ensure continuous and trouble-free service over the years.

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

1.3 It is not the intent to specify herein complete details of design and construction. The Current Transformers for Metering offered shall conform to the relevant standards and be of high quality, sturdy, robust and of good design and workmanship complete in all respects and capable to perform continuous and satisfactory operations in the actual service conditions at site and shall have sufficiently long life in service as per statutory requirements.

2.0 System Particulars:-

2.1 Nominal System Voltage	:433V
2.2 Highest System Voltage of the equipment	:0.66 kV
2.3 Voltage variation on supply side	:±10%
2.4 Basic Insulation Level	: 3 kV rms
2.5 Rated Frequency	: 50HZ with ± 3% tolerance
2.6 Number of phases	: 3 Phases
2.7 Neutral Earthing	:Solidly Effectively Earthed

3.0 Service Conditions:-

A) The Resin Cast Dry Type, Single Phase, Single Ratio type Current Transformers for Metering to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.

The climatic and isoceraunic conditions at site are given below :

(a)Max. Ambient temp : 45 ^{0}C
(b)Minimum ambient temp. : 4^{0}C
(c)Maximum relative humidity :100%
(d)Average number of thunderstorm day per annum. :75
(e)Max. No. of rainy days/annum :120 days
(f)Average Rainfall :1000 mm. to 3000 mm.
(g)Max. Wind pressure/wind speed :150 Kg. Per Mtr. sq
(h)Height above sea level (m) not exceeding :1000
(i) Earthquake acceleration horizontal seismic co-efficient : As per IS: 1893 (1984) For Class-III & IV Zones

B) The climatic conditions are prone to wide variations in ambient conditions and Moderately hot and humid tropical climate, conductive to rust and fungus growth. Hence, the Current Transformers for Metering shall be of suitable design to work satisfactorily under these conditions.

4.0 Applicable Standards:-

4.1 The design, manufacture and performance of the Current Transformers for Metering shall comply with all currently applicable statutes, regulations and safety codes. Nothing in this specification shall be construed to relieve the bidder off his responsibilities.

4.2 Unless otherwise specified, the Current Transformers for Metering offered shall conform to the latest applicable Indian, IEC, British, U.S.A. or International Standards and in particular, to the following:-

Sr. No.	Standards	Particulars
1.	IS 16227(Part-1)/(Part-2)/2016	Current Transformers
2.	IS 2071	Method of high Voltage Testing

5.0 Principal Technical Parameters of Current Transformers:

The equipment covered under this specification shall conform to specific parameters given below:

5.1 Principal Technical Parameters of Current Transformers for Metering

i)	Type of CT	:LT Resin Cast Dry Type, single Phase, Single Ratio type Current Transformer
ii)	Inner Diameter	: Not less than 40 mm.
iii)	Outer Diameter	: Not greater than 100 mm.
iv)	Type of mounting	: Base/Mounting plate with leg.
v)	Nominal System Voltage	:0.433kV
vi)	CT Rated Voltage	: 0.44kV
vii)	Corresponding Highest System Voltage	:0.66kV
viii)	Frequency	:50 Hz with ± 3% tolerance
ix)	Neutral Earthing	:Solidly Effectively Earthed
x)	One minute dry/wet power frequency Withstand Voltage (kVrms)	: 3 kV
xi)	Rated Short Time Withstand Current	:5 kA for 1 sec
xii)	Rated Dynamic Withstand Current (kAp)	:2.5 Times STC
xiii)	Instrument Security Factor	:5 or less
xiv)	Class of Insulation	: E

xiii) **Rated Continuous Thermal Current (A): 120% of the rated Primary current**

xiv)	Temperature rise	: As per IS: 16227(Part-1) & IS: 16227 (Part-2) 2016
xv)	Single Core	:Metering
xvi)	CT Ratio	:200/5A, 400/5A
xvii)	Burden	:5 VA
xviii)	ClassofAccuracy	:0.5S

6.0 General Technical Requirements of Current Transformers:-

6.1 Resin Cast Assembly:-

The Resin Cast assembly shall be of a single piece construction without any joint or coupling.

6.2 Insulation Material:-

Insulation Material used for Current Transformer should be Epoxy Resin Cast having Insulation Class E. The dielectric withstand values specified in this specification are meant for fully assembled Current Transformer. The temperature rise on any part of equipment shall not exceed the maximum temperature rise limits specified in relevant IS.

6.3 Name Plate and Rating Plate:-

The rating plate of the CT shall have distinct background colour so as to be differentiated from other classes / ratings of the CTs. The rating plate shall be fixed on the front side of the CT, so that the technical details are visible from the front side of the CT. The aesthetics and layout of the rating plate shall be approved.

6.4 Mounting Details:-

Fixing arrangement (Base/Mounting plate with leg) will have to be provided with current transformer.

6.5 Secondary Winding:-

i) Suitably insulated copper wire of electrolytic grade/Super Enameled as per IS 4800 shall be used for Secondary Windings. Type of insulations used shall be described in the offer. The cross section are a of Secondary Winding, number of Secondary Turns, Current Density etc. shall be mentioned by the bidder.

ii) The excitation current of the CT shall be as low as possible.

6.6 Core : The Core material of CTs shall be high grade non ageing electric low loss core of superior CRGO. or better.

6.7 Secondary Terminals:-

1. The design and size of the secondary studs shall be such that the terminals are suitable to carry up to 10 Amps continuously.

2. The manner of fixing the terminals shall ensure adequate and durable contact such that there is no risk of loosening or undue heating..

3. Polarity (both for primary side and secondary leads) shall be marked.

6.8 Current Transformer characteristic shall be such as to provide satisfactory performance for burdens ranging from 25% to 100% of rated burden over a range of 1% to 120% of rated current in metering CTs. Polarity shall be invariably marked in each Primary and Secondary terminal. The Instrument Security Factor of metering core shall be less than 5.This shall be demonstrated on all the ratios of metering core in accordance with procedure specified in IEC-185 or IS:16227-2016.

7.0Tests:

A) Type Test:

The bidder shall submit complete test reports of all tests (including Type Test) as stipulated in relevant IS-16227 with Complete identification, date and serial no., carried out in CPRI/ NABL accredited(THIRD PARTY)/ Government recognized Test House or Laboratory on tendered item/items. These Type Tests should have been carried out within five years/latest CEA guidelines prior to the date of opening of tender. The bidder shall be required to submit complete set of the type test reports along with the offer.

Type Tests:

1) Power frequency voltage Withstand Test.
2) Verification of terminal marking and polarity.
3) Temperature Rise Test
4) Tests for accuracy
5) Short Time Current Test and peak dynamic current test.
6) Over voltage inter turn test.

B) Acceptance & Routine Tests:-

All acceptance and routine tests as stipulated in the respective applicable standards amended up-to-date for current transformer shall be carried out by the supplier in the presence of purchaser's representative without any extra cost to the purchaser before dispatch.

The bidder shall have full facilities to carry out all the acceptance and routine test as per the applicable standards.

C) MINIMUM TESTING FACILITIES

The manufacturer shall have following testing facilities for carrying out routine and acceptance tests as mentioned in earlier clauses.

a) Automatic CT Test set-up (duly calibrated by NABL Accredited laboratories as applicable) for ratio error and phase angle error measurement.

b) Burden Box.

c) High voltage tester.

d) Test facility for over-voltage inter-turn testing.

e) The manufacturer shall possess duly calibrated Standard CT of Class 0.05 accuracy.

f) The manufacturer shall submit the list of testing facilities available with him.

After finalization of the program of type/acceptance/routine testing, the supplier shall give 15 days advance intimation to the purchaser, to enable him to depute his representatives for witnessing the tests.

D) Acceptance & Routine Tests:

1) Power frequency voltage Withstand Test.
2) Tests for accuracy.
3) Verification of terminal marking and polarity.
4) Determination of the secondary winding resistance
5) Determination of the ISF.
6) Interturn overvoltage test.

8.0 Inspection:-

i) 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 representative at any reasonable time when the work is in progress. All facilities must be made available by supplier/ manufacturer for unrestricted inspection of the works, raw material & manufacture of all the accessories & for conducting necessary tests as declared therein.

ii) No current transformer shall be dispatched from its point of manufacture unless the current transformer has been satisfactorily inspected and tested.

iii) Inspection and acceptance of any current transformer under this specification by the purchaser shall not relieve the supplier of his obligation of furnishing current transformer in accordance with thes pecification and shall not prevent subsequent rejection, if the current transformer is found to be defective.

9.0 Quality Assurance Plan :-

i) In case of new vendor, WBSEDCL's standard procedure to be followed.

10.0 Performance Guarantee:

The equipment offered shall be guaranteed for satisfactory performance for a period of 60 months from the date of receipt of complete equipment at site in good condition. In case of failure within this period, the supplier shall make necessaryrepairs/replacementofthefaultycurrenttransformeratnoextracost to the purchaser.

11.0 Documentation:-

A) List of Drawings & Documents:-

The bidder shall furnish two sets of the following drawings along with his offer.

a) General outline and assembly drawings of the equipment
b) Graphs showing the performance of Current Transformer in regard to Magnetization Characteristic.
c) Sectional views showing:-
   i) General Constructional features of Current Transformer, size of conductor, it's cross section.
   ii) The insulation, the winding arrangements, method of connection of the primary / secondary winding to the primary / secondary terminals etc.
d) Arrangement of secondary Terminal
e) Name Plate
f) Schematic drawing
g) Type Test reports.
h) Bill of material and packing list.

B) The successful bidders/suppliers shall submit three sets of final versions of all the above said drawings in line with Technical Specifications & Drawings attached for purchaser's approval after placement of order.

C) The manufacturing of the current transformers shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of the purchaser. All manufacturing and fabrication work in connection with the current transformers prior to the approval of the drawing shall be at the supplier's risk.

D) Approval of drawings by purchaser shall not relieve the supplier of his responsibility and liability for ensuring correctness and correct interpretation of the drawings for meeting the requirement of the Technical Specification, latest revision of applicable standards, rules and codes of practices. The equipment shall conform in all respects to high standards of engineering, design, workmanship and latest revisions of relevant standards at the time of ordering and purchaser shall have the power to reject any work or materials which, in his judgment, is not in full accordance there with.

12.0 Packing & Forwarding :-

i) Each consignment shall be accompanied by a detailed packing list containing the following information:

a) Name of the consignee
b) Details of consignment
c) Destination
d) Total weight of consignment
e) Sign showing upper/lower side of the crate
f) Handling and unpacking instructions
g) Bill of material indicating contents of each package

13.0 Information to be filled/furnished invariably by Bidder:

The offer shall be complete in all respects, failing which thes ame are liable for rejection. Guaranteed technical particulars for current transformer shall be elaborate and complete in all respects. It may be noted that the technical evaluation of the tender is made mainly based on the guaranteed technical particulars and deviations from the specifications furnished along with the technical offer.

14.0 Guaranteed Technical Particulars:

The bidder should fill up the details in scheduleA–"Guaranteed Technical Particulars "and the statement such as" as per drawing enclosed", "as per WBSEDCL requirement", "as per IS", "as per specification" etc. shall be considered as details not furnished and such offers will be rejected.

15.0 Schedules:-

The bidder shall fill in the following Schedule which forms part of the Tender Specification and offer. If the schedules are not submitted duly filled in with the offer, the offer shall be liable for rejection.

SCHEDULE– "A"-Guaranteed Technical Particulars of LT Resin Cast Dry Type, Single Phase, Single Ratio type Current Transformers for Metering.

SCHEDULE – "B" -List of Type Test Reports to be enclosed with the offer

SCHEDULE – "C" -Schedule of Deviations from Specification

SCHEDULE – "D" - Schedule of Deviations from Specified Standards

SCHEDULE –"E" - -Deviations from specified Test requirements in Relevant Standards and Present Specification

The Bidder shall submit the list of orders for similar type equipments executed or under execution during last five years, with full details, in the schedule of Bidders experience (Schedule "D") to enable the purchaser to evaluate the tender.

ANNEXURE–A

Principal TechnicalParameters of LT Resin Cast Dry Type, Single Phase, Single Ratio type Current Transformers for Metering

Sr. No.	Item	Specification
1.	Type of CT/Installation	Resin Cast, Dry Type, Single Phase, Single Ratio type Current Transformer
2.	Suitable for frequency	50 Hz with ± 3% tolerance
3.	Method of Earthing system to be connected to	Solidly Effectively Earthed
4.	Rated Continuous Thermal Current(A)	120% of the rated Primary current
5.	Acceptable limit of temperature rise above the specified ambient temperatures for continuous operation at rated current	As per IS: 16227(Part-1) & IS:16227(Part-2) 2016
6	CT Ratio	200/5A, 400/5A
7	VA Burden	5 VA
8	Class of Accuracy	0.5S
9.	Rated Voltage/HSV (kVrms)	0.44/0.66
10.	One minute dry/wet Power frequency Withstand Voltage (kV rms)	3 kV
11.	Rated Short Time Withstand Current for1 Second duration (kArms)	5 kA
12.	Rated Dynamic Withstand Current for 1 Second duration (kAp)	2.5 Times STC
13.	Power Frequency Over Voltage Withstand requirement for Secondary Winding(kVrms)	3kV
14.	Instrument Security Factor	5 or less
15	Inner Diameter	Not less than 40 mm
16	Outer Diameter	Not greater than 100 mm

ANNEXURE–B

Current Transformer rating plate

CURRENT TRANSFORMER	
AS PER IS: 16227	
RATIO:	
MONTH & YEAR OF MFG.:	MM/YYYY
SL. NO.:	TYPE: LT ODCT
Rated Voltage(kV) / HSV (kVrms)	:0.440/0.66
RATED CONT. TH. CURRENT: 1.2 X RATED PR. CURRENT	INSULATTON CLASS : E
S T C (th): 5 kA for 1 sec.	DYNAMIC CURRENT : 12.5 kAp
VA: 5	CLASS: 0.5 S
ISF<=5	FREQ. :50 HZ
GUARANTEE PERIOD: 5 YRS	PROJECT:
PROPERTY OF WBSEDCL	
MFG NAME:	

SCHEDULE'A'

Guaranteed Technical Particulars of LT Resin Cast Dry Type, Single Phase, Single Ratio type Current Transformers for Metering

Sr. No.	Particular of GTP Parameter	To be furnished by bidder
1.	Manufacturers Name & address	
2.	Type of equipment	
3.	Type of Mounting	
4.	Equipment Conforming to Standards	
5.	Rated Voltage / Highest System Voltage in KV	
6.	Rated Primary Current(Amp)	
7.	Rated Secondary Current(Amp)	
8.	Frequency(HZ)	
9.	Ratio of Current Transformer	
10.	Details of Cores	
i)	Number of Cores	
ii)	Purpose	
iii)	Burden(VA)	
iv)	Class of Accuracy	
11.	Rated Short Time Withstand Current For 1Sec. duration	
12.	Rated Dynamic Withstand Current (KAp)	
13	One minute Power Frequency Withstand Voltage (KV rms) of Secondary Winding	
14.	Total Weight (KG)	
15.	Mounting details	

16.	Overall dimension	
17.	Magnetization Curves are submitted?(Y/N)	
18.	Type of Winding	
19.	Material of Winding	
20.	No. of Secondary Turns	
21.	Current Density of Secondary Winding	
22.	Type of Insulation	
23.	Whether Current Transformer Confirms to Temperature Rise limits	
24.	Whether Type test reports(within five years) as per Technical Specification are submitted?(Y/N)	
25.	Whether Drawings are submitted along with the offer? (Y/N)	
26.	Rated continuous Thermal Current (120% of the rated Primary Current)	
27.	Instrument Security Factor(ISF≤5)	
28.	Class of Insulation	
29	Inner diameter	
30	Outer diameter	
31	Whether Resin Cast	

SCHEDULE'B'

List of Type Test Reports to be enclosed with the offer

Sr. No.	Description of Type Test	Type & Make of Current Transformer & its rating	IS/IEC Clause No.	Testing Lab.& Date of Testing	Type test Report No., Dt & pages	Whether Certificate of compliance With IS/IEC is enclosed With T.R.
	LT Resin Cast Dry Type Current Transformers					
1.	Temperature Rise Test					
2.	Power frequency voltage Withstand Test.					
3	Tests for accuracy					
4.	Short Time Current Test					

Name of the manufacturer_____

Signature of the bidder_____

Designation_____

Date_____

SCHEDULE'C'

Schedule of Deviations from Specification

Sr.No.	Clause No.	Details of Deviations
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

Name of the manufacturer_____

Signature of the bidder_____

Designation_____

Date_____

SCHEDULE'D'

Schedule of Deviations from Specified Standards

Sr. No.	Particulars	Stipulation of specified standard		Stipulation of standard adopted by bidder		Remarks
		Standard ref.	Stipulations	Standard ref.	Stipulations	
1.						
2.						
3.						
4.						
5.						
6.						
7.						

Name of the manufacturer_____

Signature of the bidder_____

Designation_____

Date_____

SCHEDULE'E'

Deviations from Specified Test requirements Specified in Relevant Standards and Present Specification.

Sr. No.	Name of Test	Standard No. & Clause No.	Requirement of standards	Proposed deviation	Reasons for deviation
1.	Type Test				
2	Additional Test				
3	Acceptance Test				
4	Routine Test				

Name of the firm_____

Signature of the bidder_____

Designation_____

Date_____

Office of the Chief Engineer
Distribution (P & E) Department

Minutes of the Meeting of the Standardization Committee reconstituted on 19/09/2023 vide Office Order No. 117 by the Director (Distribution) held on 25th October, 2024 at the Conference Room of P&E-Dist., 2nd floor, A Block, Vidyut Bhavan.

1. **Modification Technical specification of Resin Cast LT CT of different ratio–** In the existing specification of Resin Cast LTCT of different ratio the type of the resin was considered as cycloaliphatic type. This type of resin cast CT is suitable for outdoor use. CE, Communication has proposed that the indoor type LT CT to be considered for 200/5A and 400/5A ratio, as these will be installed inside the SMC box for DTR smart metering Project. Accordingly the technical committee constituted vide O.O No 14 dtd 19/07/2024 Of director(Distribution) has prepared a separate Technical Specification for indoor type LT resin cast CT of 200/5 A and 400/5 A. This technical specification is accepted by the members of the standardization committee with some modification. The final specification is signed by the members.

2. **New Technical specification of 1.1 KV Al XLPE insulated armoured cable of different size–** The technical committee constituted as per Office order no: DD/NR/6 dtd:29.02.24 of Director (Distribution) has placed the technical specification of 1.1 KV Al XLPE insulated armoured cable of different size in the meeting. After discussion, the draft TS is accepted with some modification. The final specification is signed by the members.

25.10.24 D Chowdhury CE:P&E-Dist	25/10/24 S. G. Datta CE: P&CD	25/10/24 D Pal CE:Communication
25.10.24 M Mukhopadhyay ACE: P&E	25/10/24 A Makur ACE: DTD	25/10/24 B Saha ACE: P&CD
25/10/24 S Gayen ACE: P&E	25.10.24 P Bhowmik SE : P&CD	25/10/24 A Biswas SE: DTD
25/10/24 S Ray SE:P&E	25/10/24 S Ray DE,P&E	