

**Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type
Potential Transformers for Protection & Metering**



Maharashtra State Electricity Distribution Company Limited

Technical Specification of
11kV, 22kV and 33kV Outdoor Resin Cast (Cycloaliphatic) Dry Type
Potential Transformers for Protection and Metering
For Distribution System In MSEDCL

Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type Potential Transformers for Protection & Metering

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MAHARASHTRA STATE ELECTRICITY DISTRIBUTION CO. LTD.

Technical Specification for

11kV, 22kV and 33kV Outdoor Resin Cast (Cycloaliphatic) Dry Type

Potential Transformers for Protection and 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 11kV, 22kV, 33kV Outdoor Resin Cast (Cycloaliphatic) Potential Transformers for protection and metering to be installed at various 33/11 kV, 33/22 kV, 22/11 kV sub-stations in MSEDCL, Maharashtra. The Outdoor Resin Cast (Cycloaliphatic) Potential Transformers 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 Potential Transformers shall, therefore, be of the highest order to ensure continuous and trouble-free service over the years.
- 1.2** The Outdoor Resin Cast (Cycloaliphatic) Potential Transformers 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 Outdoor Resin Cast (Cycloaliphatic) Potential Transformers 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 | : 11kV, 22kV, 33kV |
| 2.2 Voltage variation on supply side | : $\pm 10\%$ |
| 2.3 Corresponding Highest System Voltage | : 12kV, 24kV, 36kV |
| 2.4 Frequency | : 50 HZ with $\pm 3\%$ tolerance |
| 2.5 Transient condition | : -20% or +10% combined variation of voltage and frequency |
| 2.6 Number of phases | : 3 Phases |
| 2.7 Neutral Earthing | : Solidly effectively earthed |

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3.0 Service Conditions:-

A) Outdoor Resin Cast (Cycloaliphatic) Potential Transformers to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.

3.1 Maximum ambient Temperature (Degree C)	50
3.2 Maximum temperature in shade (Degree C)	45
3.3 Minimum Temperature (Degree C)	3.5
3.4 Relative Humidity (percent)	10 to 100
3.5 Maximum Annual rain fall (mm)	1450
3.6 Maximum wind pressure (kg/sq.m)	150
3.7 Maximum altitude above mean sea level (Meter)	1000
3.8 Isoceranac level (days per year)	50
3.9 Seismic level (Horizontal Acceleration)	0.3g

Moderately hot and humid tropical climate conducive to rust and fungus growth

B) The climatic conditions are prone to wide variations in ambient conditions and hence the Outdoor Resin Cast (Cycloaliphatic) Potential Transformers shall be of suitable design to work satisfactorily under these conditions.

4.0 Applicable Standards :-

- 4.1 The design, manufacture and performance of the Outdoor Resin Cast (Cycloaliphatic) Potential Transformers 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 Outdoor Resin Cast (Cycloaliphatic) Potential Transformers 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 2165	Insulation coordination of highest voltages for equipments
2.	IS 16227 (Part-1)2016/ IS 16227(Part-3) /2015	Potential Transformers
3.	IS-3202	Code of practice for climate proofing of electrical equipments
4.	IS 2071	Method of high Voltage Testing
5.	IS 2147	Degree of protection provided by enclosures for low voltages, Switchgear & Control

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6.	IEC 186	Potential Transformers
7.	IEC 270	Partial Discharge measurement
8.	IEC 44(4)	Instrument Transformer measurement of PDs
9.	IEC 60	High Voltage Test Techniques

5.0 Principal Technical Parameters of Potential Transformers :-

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

5.1 Principal Technical Parameters of 11kV Outdoor Resin Cast (Cycloaliphatic) Dry Type Potential Transformers for Protection and Metering

- i) Type of PT : Single Phase, Outdoor, Resin Cast (Cycloaliphatic), Dry Type Potential Transformer
- ii) Type of mounting : Pedestal Type
- iii) Nominal System Voltage : 11kV
- iv) Corresponding Highest System Voltage : 12kV
- v) Frequency : 50 Hz with $\pm 3\%$ tolerance
- vi) Neutral earthing : Solidly effectively earthed
- vii) Lightning Impulse Withstand Voltage (kVp) : 75
- viii) One minute dry/wet power frequency Withstand Voltage primary (kV rms) : 28
- ix) Minimum Creepage Distance (mm) : 300
- x) Clear height of bushing (Bird Clearance in mm) : 370
- xi) Power Frequency Over Voltage Withstand requirement for Secondary winding (kVrms) : 3kV
- xii) Rated Voltage Factor : 1.2 Continuous & 1.5 for 30 Sec.
- xiii) The die-electric withstand values of External & Internal Insulation : 28 kV/75 kVp
- xiv) Temperature rise : As per IS: 16227(Part-1)2016 & IS: 16227 (Part-3) 2015
- xv) Core I : Metering
- xvi) Core II : Protection
- xvii) PT Ratio : $11kV/\sqrt{3}/110v/\sqrt{3}-110v/\sqrt{3}$,
- xviii) Burden** : 50VA/50VA
- xix) Class of Accuracy : 0.2/3P

Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type Potential Transformers for Protection & Metering

- xx) Primary Terminal requirement : One, 30mm Dia. x 80mm Length
- xxi) Mounting Frame size requirement (mm×mm) : 350mmx350mm, Mounting Holes and mounting hole diameter(mm) : - Dia. 30mm

5.2 Principal Technical Parameters of 22kV Outdoor Resin Cast (Cycloaliphatic) Dry Type Potential Transformers for Protection and Metering.

- i) Type of PT : Single Phase, Outdoor, Resin Cast (Cycloaliphatic), Dry Type Potential Transformer
- ii) Type of mounting : Pedestal Type
- iii) Nominal System Voltage : 22kV
- iv) Corresponding Highest System Voltage : 24kV
- v) Frequency : 50 Hz with $\pm 3\%$ tolerance
- vi) Neutral earthing : Solidly effectively earthed
- vii) Lightning Impulse Withstand Voltage (kVp) : 125
- viii) One minute dry/wet power frequency Withstand Voltage primary (kV rms) : 50
- ix) Minimum Creepage Distance (mm) : 600
- x) Clear height of bushing (Bird Clearance in mm) : 450
- xi) Power Frequency Over Voltage Withstand requirement for Secondary winding (kVrms) : 3kV
- xii) Rated Voltage Factor : 1.2 Continuous & 1.5 for 30 Sec.
- xiii) The die-electric withstand values of External & Internal Insulation : 50 kV/125 kVp
- xiv) Temperature rise : As per IS: 16227(Part-1) 2016 & IS: 16227 (Part-3) 2015
- xv) Core I : Metering
- xvi) Core II : Protection
- xvii) PT Ratio : $22\text{kV}/\sqrt{3}/110\text{v}/\sqrt{3}-110\text{v}/\sqrt{3}$,
- xviii) Burden : 50VA/50VA
- xix) Class of Accuracy : 0.2/3P
- xx) Primary Terminal requirement : One, 30mm Dia. x 80mm Length
- xxi) Mounting Frame size requirement (mm×mm) : 350mmx350mm, Mounting Holes and mounting hole diameter(mm) : - Dia. 30mm.

Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type Potential Transformers for Protection & Metering

5.3 Principal Technical Parameters of 33 kV Outdoor Resin Cast (Cycloaliphatic) Dry Type Potential Transformers for Metering

i) Type of PT	: Single Phase, Outdoor, Resin Cast (Cycloaliphatic), Dry Type Potential Transformer
ii) Type of mounting	: Pedestal Type
iii) Nominal System Voltage	: 33kV
iv) Corresponding Highest System Voltage	: 36kV
v) Frequency	: 50 Hz with $\pm 3\%$ tolerance
vi) Neutral earthing	: Solidly effectively earthed
vii) Lightning Impulse Withstand Voltage (kVp)	: 170
viii) One minute dry/wet power frequency Withstand Voltage primary (kV rms)	: 70
ix) Minimum Creepage Distance (mm)	: 900
x) Clear height of bushing (Bird Clearance in mm)	: 450
xi) Power Frequency Over Voltage Withstand requirement for Secondary winding (kVrms)	: 3kV
xii) Rated Voltage Factor	: 1.2 Continuous & 1.5 for 30 Sec.
xiii) The die-electric withstand values of External & Internal Insulation	: 70 kV/170 kVp
xiv) Temperature rise	: As per IS: 16227(Part-1) 2016 & IS: 16227 (Part-3) 2015
xv) Core I	: Metering
xvi) PT Ratio	: $33kV/\sqrt{3}/110v/\sqrt{3}$
xvii) Burden	: 50VA
xviii) Class of Accuracy	: 0.2
xix) Primary Terminal requirement	: One, 30mm Dia. x 80mm Length
xx) Mounting Frame size requirement (mm×mm) and mounting hole diameter(mm)	: 450mm×450mm, Mounting Holes - Dia. 30mm

6.0 General Technical Requirements of Potential Transformers:-

6.1 Resin Cast Assembly :-

The Resin Cast assembly shall be of a single piece construction without any joint or coupling. The vertical clearance of Live part to Ground shall be at least 370 mm for 11 KV Potential Transformer and 450 mm for both 22KV & 33KV Potential Transformer.

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6.2 Insulation Material :-

Insulation Material used for Potential Transformer should be Cycloaliphatic Epoxy Resin Cast having Insulation Class B. The insulation of the Potential Transformers shall be so designed that the internal insulation shall have higher electrical withstand capability than the external insulation. The dielectric withstand values specified in this specification are meant for fully assembled Potential Transformer. The temperature rise on any part of equipment shall not exceed the maximum temperature rise limits specified in relevant IS.

6.3 Earthing :-

The Potential Transformer shall be provided with Two separate Earthing Terminals for bolted connection to MS flat. The size of two numbers of Earthing Terminals shall be 16 mm dia. x 30 mm length, Hot Dip Galvanized with one plain washer and one nut.

6.4 Name Plate and Rating Plate:-

The Potential Transformer shall be provided with non-corrosive, legible Name plate, with the information specified in relevant standards, duly engraved / punched on it. The Potential Transformer shall be provided with a rating plate with dimensions and marking as per IS – 16227. The markings shall be punched and not painted. The serial number and code of the supplier shall also be punched on the Potential Transformer to identify the unit in case of loss or damage to the rating plate.

6.5 Mounting Details :-

Mounting details for fixing the Potential Transformer on supporting structure shall be strictly in accordance with the specified details as follows:

For 11KV & 22KV Potential Transformer requirement of Mounting Frame size is 350 mm×350 mm with mounting holes of Dia. 30mm.

For 33KV Potential Transformer requirement of Mounting Frame size is 450 mm×450 mm with mounting holes of Dia. 30mm.

The Terminal connectors required for connection of Potential Transformer are in the scope of purchaser.

6.6 Winding :-

Suitably insulated copper wire of electrolytic grade shall be used for Primary and Secondary Windings. Type of insulation used shall be described in the offer.

6.7 Primary Terminals :-

Primary Terminal shall be made out of 1 rod (stud) of 30 mm dia. x 80 mm length. The primary Terminal shall be of heavily tinned electrolytic copper of 99.9% conductivity. The minimum thickness of tinning shall be 15 microns.

6.8 Secondary Terminals :-

i) Secondary Terminals shall be brought out in a weatherproof metallic Terminal box. The Terminal box shall be provided with removable gland and glands. The cable

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glands shall be suitable for 1100 volts grade plate PVC insulated, PVC sheathed multi core stranded 6 Sq.mm copper conductor cable. This Terminal box shall be dust and vermin proof. The dimensions of the Terminal box and its opening shall be adequate to enable easy access and working space with the use of normal tools.

ii) Secondary Terminal studs shall be provided with at least 3 nuts and adequate plain and spring washer for fixing the leads. The studs, nuts and washer shall be made of brass duly nickel-plated. The minimum outside diameter of stud shall be 6 mm. The length of at least 15 mm shall be available on the studs for inserting the leads. Horizontal spacing between centers of adjacent studs shall be at least 1.5 times the circum dia. of the nuts.

iii) Polarity shall be invariably marked at Secondary terminal in Terminal box.

6.9 Lifting arrangement:

The P.T. shall be Outdoor Cycloaliphatic Epoxy Resin Cast and shall be so constructed that it can be easily transported to site within the allowable transport limitation. PT shall be provided with lifting lugs suitably located for easy mounting, dismantling & transportation purpose. The lifting arrangement shall be positioned in such a way as to avoid any damage.

6.10 The antitracking paint shall be applied to PT, the colour shall be Light admiralty grey - Shade No. 697 as per IS 5.

7.0 Tests:

A) Type Test :

The Potential Transformer offered in the Bid should have been successfully type tested at NABL laboratories for the tests indicated as follow in line with the relevant standard and technical specification. These Type Tests should have been carried out within seven (07) years 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.

In case these type tests are conducted earlier than seven (07) years, all the type tests as per the relevant standard shall be carried out by the successful bidder at NABL in presence of purchaser's representative free of cost before commencement of supply. The undertaking to this effect should be furnished along with the offer without which the offer shall be liable for rejection.

If there is any change in the design/ type of old type tested Potential transformers to be offered against this specification, then the offer is considered for placement of order. However, successful bidders have to carry out the said type tests on offered type Potential transformers before commencement of supply at their own expense.

Type Tests :

- 1) Temperature Rise Test
- 2) Impulse Voltage Withstand Test on Primary Terminals
- 3) Wet Test for outdoor Type Transformers
- 4) Tests for accuracy
- 5) Short Circuit Withstand Capability Test

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B) Acceptance & Routine Tests :-

All acceptance and routine tests as stipulated in the respective applicable standards amended up-to-date for Potential 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.

- 1) Power frequency voltage Withstand Test on Primary Terminals
- 2) Partial discharge measurement
- 3) Power frequency voltage Withstand Test between sections
- 4) Power frequency voltage Withstand Test on secondary Terminals
- 5) Tests for accuracy
- 6) Verification of marking

8.0 Inspection :

- i) The inspection may be carried out by the MSEDCL at any stage of manufacture. The successful bidder shall grant free access to the MSEDCL'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) The supplier shall keep the purchaser informed, in advance, of the time of starting and of the progress of manufacture of Potential transformer in its various stages so that arrangement should be made for inspection.
- iii) No Potential transformer shall be dispatched from its point of manufacture unless the Potential transformer has been satisfactorily inspected and tested.
- iv) Inspection and acceptance of any Potential transformer under this specification by the purchaser shall not relieve the supplier of his obligation of furnishing Potential transformer in accordance with the specification and shall not prevent subsequent rejection, if the Potential transformer is found to be defective.

9.0 Qualifying requirements:-

The Bidder should have proven experience of not less than 5 years in design, manufacture, supply, and testing at works for the Potential transformer offered of equal or higher voltage class. The Potential transformer offered by the Bidder should be in successful operation at least for 2 years as on the date of submission of the tender.

10.0 Quality Assurance Plan :-

- A) The Bidder shall invariably furnish the following information along with his offer, failing which his offer shall be liable for rejection. Information shall be given for offered Potential Transformer.
 - i) Statement giving list of important raw materials, including but not limited to:
 - a. Conductor
 - b. Insulation/ core material
 - c. Sealing material
 - d. Insulated Wire

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- ii) Names of sub suppliers for the raw materials, list of standards according to which the raw materials are tested, list of Tests normally carried out on raw materials in presence of bidder's representative, copies of Test Certificates. Information and copies of Test Certificates as in (i) above in respect of bought out materials.
 - iii) List of manufacturing facilities available. In this list the bidder shall specifically mention whether lapping machine, vacuum drying plant, air-conditioned dust free room with positive air pressure for provision of insulation, facility for testing tan- delta of insulation at rated voltage etc. are available as in house testing facilities or hired services.
 - iv) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.
 - v) Special features provided in the equipment to make it maintenance free.
- B) The successful Bidder shall, within 30 days of placement of order, submit following information to the Purchaser.
- i) List of raw materials as well as bought out accessories and the names of sub suppliers selected from those furnished along with offer.
 - ii) Test Certificates of the raw material and bought out accessories.
 - iii) Quality assurance plan (QAP) with hold points for purchaser's inspection. The quality assurance plan and purchaser's hold points shall be discussed between the purchaser and supplier, before the QAP is finalized.
- C) The successful Bidder shall submit the routine test certificates of bought out accessories at the time of routine testing of the fully assembled Potential Transformer.

11.0 Performance Guarantee :-

The Potential Transformer offered shall be guaranteed for satisfactory performance for a period of 30 months from the date of receipt of complete equipment at site in good condition or 24 months from the date of satisfactory commissioning, whichever is earlier. In case of failure within this period, the supplier shall make necessary repairs / replacement of the faulty current transformer at no extra cost to the purchaser.

12.0 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 Potential Transformer.
- b) Graphs showing the performance of Potential Transformer in regard to Magnetization Characteristic.
- c) Sectional views showing :-
 - i) General Constructional features of Potential Transformer, size of conductor, it's cross section, Clearance between live part & ground along with all Technical details.
 - 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 box & details of connection studs provided.
- e) Name Plate

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- f) Schematic drawing
 - g) Type Test reports in case the Potential Transformer has already been type tested.
 - h) Test reports, literature, pamphlets of the bought out items, and raw material
 - i) Bill of material and packing list.
- B)** The successful bidders 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 LOA. The purchaser shall communicate his comments / approval on the drawings to the supplier within two weeks. The supplier shall, if necessary, modify the drawings and resubmit three copies of the modified drawings for purchaser's approval within two weeks from the date of purchaser's comments. Chief Engineer (Testing & QC Cell) will convey the drawing approval.
- C)** Adequate copies of acceptance and routine Test Certificates, duly approved by the purchaser, shall accompany the dispatched consignment.
- D)** The manufacturing of the Potential 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 Potential Transformers prior to the approval of the drawing shall be at the supplier's risk.
- E)** One set of nicely printed and bound volume of operation, maintenance and erection manuals in English language per Potential Transformer of each voltage rating shall be submitted by the supplier to respective consignees along with the dispatch documents of each unit. The manual shall contain all the drawings and information required for erection, operation and maintenance of the Potential Transformer. The manual shall also contain a set of all the approved drawings, Type Test reports etc.
- F)** 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 Potential Transformer 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 therewith.

13.0 Packing & Forwarding :-

- i) The Potential Transformers shall be packed in wooden crates of good quality and shall be suitable for vertical / horizontal transportation as the case may be, and suitable to withstand handling during transport and outdoor storage in stores before erecting. The supplier shall be responsible for any damage to the equipment during transit, due to improper and inadequate packing. The easily damageable material shall be carefully packed and marked with the appropriate caution symbols. Wherever necessary, proper arrangement for lifting, such as lifting hooks etc. shall be provided. Any material found short inside the packing cases shall be supplied by supplier without any extra cost.
- ii) Each consignment shall be accompanied by a detailed packing list containing the following information:

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- 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

iii) The supplier shall ensure that the packing list and bill of material are approved by the purchaser before dispatch.

14.0 Information to be filled / furnished invariably by Bidder:

The offer shall be complete in all respects, failing which the same are liable for rejection. Guaranteed technical particulars for Potential 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.

15.0 Guaranteed Technical Particulars :

The bidder should fill up the details in schedule A – ‘Guaranteed Technical Particulars’ and the statement such as “as per drawing enclosed”, “as per MSEDCL requirement”, “as per IS”, “as per specification” etc. shall be considered as details not furnished and such offers will be rejected.

16.0 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 11kV, 22kV & 33kV Resin Cast (Cycloaliphatic) Dry Type Potential Transformers (Protection & 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 Bidder’s Experience.

SCHEDULE – ‘E’ - Schedule of Deviations from Specified Standards

SCHEDULE – ‘F’ - Deviations from specified Test requirements specified in Relevant Standards and Present Specification

SCHEDULE – ‘G’ - Proforma of Undertaking

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. In case the Potential Transformers are being designed and manufactured in collaboration with other manufacturer, the following additional information shall be submitted by the Bidder along with his offer.

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- (i) Copy of collaboration agreement executed between the bidder and the collaborator.
- (ii) List of orders for similar equipments, executed / being executed by the collaborator during last ten years and performance certificate for seven years of satisfactory operation.

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**ANNEXURE - A
Principal Technical Parameters of 11kV & 22kV
Resin Cast (Cycloaliphatic) Dry Type Potential Transformers
(Protection & Metering)**

Sr. No.	Item	Specification
1.	Type of PT/Installation	Single Phase, Outdoor, Resin Cast Dry Type Potential Transformer (Cycloaliphatic)
2.	Type of mounting	Pedestal Type
3.	Suitable for frequency	50 Hz with $\pm 3\%$ tolerance
4.	Rated Voltage Factor	1.2 continuous & 1.5 for 30 seconds
5.	Method of Earthing the system to be connected to	Solidly Effectively Earthed
6.	Acceptable limit of temperature rise above the specified ambient temperatures for continuous operation at rated current	As per IS: 16227(Part-1) 2016 & IS:16227 (Part-3) 2015
7.	Core details	
Purpose of core	11 kV PT	22 kV PT
	Core I for Metering & Core II for Protection	Core I for Metering & Core II for Protection
PT Ratio	11kV/ $\sqrt{3}$ /110V/ $\sqrt{3}$ -110V/ $\sqrt{3}$,	22kV/ $\sqrt{3}$ /110V/ $\sqrt{3}$ -110V/ $\sqrt{3}$,
VA Burden	50 VA/50VA	50 VA/50VA
Class of Accuracy	0.2/3P	0.2/3P

Technical Particulars		11 kV	22 kV
8.	Rated Voltage / HSV (kVrms)	11kV/12kV	22kV/24kV
9.	Lightning Impulse Withstand Voltage (kVp)	75	125
10.	One minute dry/wet power frequency withstand voltage primary (kV rms)	28	50
11.	Minimum Creepage Distance (mm)	300	600
12.	Primary Terminal requirement	One, 30mm Dia.× 80 mm length	
13.	Mounting Frame size requirement (mm×mm), mounting holes diameter (mm)	350mmx350mm, Mounting Holes- Dia. 30mm	
14.	Power Frequency Over Voltage withstand requirement for Secondary winding (kvrms)	3kV	
15.	The die-electric withstand values of External & Internal Insulation	28 kV/75 kVp	50 kV/125 kVp

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**ANNEXURE - B
Principal Technical Parameters of 33kV
Resin Cast (Cycloaliphatic) Dry Type Potential Transformers
(Metering)**

Sr. No.	Item	Specification
1.	Type of PT/Installation	Single Phase, Outdoor, Resin Cast Dry Type Potential Transformer (Cycloaliphatic)
2.	Type of mounting	Pedestal Type
3.	Suitable for frequency	50 Hz with $\pm 3\%$ tolerance
4.	Rated Voltage Factor	1.2 continuous & 1.5 for 30 seconds
5.	Method of Earthing the system to be connected to	Solidly Effectively Earthed
6.	Acceptable limit of temperature rise above the specified ambient temperatures for continuous operation at rated current	As per IS: 16227(Part-1) 2016 & IS:16227(Part-3) 2015
7.	Core details	
	Purpose of core	33 kV PT Core I for Metering
	PT Ratio	$33kV/\sqrt{3}/110V/\sqrt{3}$
	VA Burden	50 VA
	Class of Accuracy	0.2
	Technical Particulars	33 kV
8.	Rated Voltage / HSV (kVrms)	33kV/36kV
9.	Lightning Impulse Withstand Voltage (kVp)	170
10.	One minute dry/wet power frequency withstand voltage primary (kV rms)	70
11.	Minimum Creepage Distance (mm)	900
12.	Primary Terminal requirement	One, 30mm Dia. \times 80 mm length
13.	Mounting Frame size requirement (mm \times mm), mounting holes diameter (mm)	450mm \times 450mm, Mounting Holes- Dia. 30mm
14.	Power Frequency Over Voltage withstand requirement for Secondary winding (kvrms)	3kV
15.	The die-electric withstand values of External & Internal Insulation	70 kV/170kVp

**Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type
Potential Transformers for Protection & Metering**

SCHEDULE 'A'

**Guaranteed Technical Particulars of
11kV Resin Cast (Cycloaliphatic) Dry Type
Potential Transformers (Protection & Metering)**

Sr. No.	Particular of GTP Parameter	MSEDCL Requirement	To be offered by the bidder
1.	Manufacturer's Name & address	Mfg. to give details	TEXT
2.	Manufacturer's Type Designation/Type of PT	Single Phase, Outdoor, Resin Cast (Cycloaliphatic) Dry Type PT	TEXT
3.	Type of Mounting	Pedestal Type	TEXT
4.	Equipment Conforming to Standards	16227(Part-1) 2016 & IS:16227 (Part-3) 2015	TEXT
5.	Rated Voltage/Highest System Voltage in KV	11kV/12kV	TEXT
6.	Rated Primary Voltage (kV)	11kV/ $\sqrt{3}$	TEXT
7.	Number of Secondary Windings	Two	TEXT
8.	Rated Secondary Voltage (Volt)	110V/ $\sqrt{3}$ -110V/ $\sqrt{3}$	TEXT
9.	Frequency (HZ)	50 HZ	TEXT
10.	Ratio of Potential Transformer	11kV/ $\sqrt{3}$ /110V/ $\sqrt{3}$ -110V/ $\sqrt{3}$	TEXT
11.	Details of Cores		
i)	Core Number (I & II)	I & II	TEXT
ii)	Purpose	I- Metering II-Protection	TEXT
iii)	Burden (VA)	50/50VA	TEXT
iv)	Class of Accuracy	0.2/3P	TEXT
12.	Method of Earthing system to be connected to	Solidly effectively earthed	TEXT
13.	Rated Voltage Factor	1.2 continuous & 1.5 for 30 seconds	TEXT
14.	One minute Dry Power Frequency Withstand Voltage (KV rms) of Primary Winding	28kVrms	TEXT
15.	One minute Wet Power Frequency Withstand Voltage (KV rms) of Primary Winding	28kVrms	TEXT
16.	1.2/50 micro-second Impulse Withstand Voltage (KVP)	75kVp	TEXT
17.	The die-electric Withstand values (KVP)of external & internal insulation	28kVrms/75kVp	TEXT
18.	One minute Power Frequency Withstand Voltage (KV rms) of Secondary Winding	3kVrms	TEXT
19.	Minimum Creepage Distance (mm)	300mm (min.)	TEXT
20.	Total Weight (KG)	Mfg. to give details	TEXT

Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type Potential Transformers for Protection & Metering

21.	Mounting details	350mmx350mm, Mounting Holes - Dia. 30mm	TEXT
22.	Overall dimension	Mfg. to give details	TEXT
23.	Type of Winding	Wound Type	TEXT
24.	Material of Winding	EC grade Copper	TEXT
25.	Size & Cross Section of Primary Winding	Mfg. to give details	TEXT
26.	Size & Cross Section of Secondary Winding	Mfg. to give details	TEXT
27.	No. of Primary Turns	Mfg. to give details	TEXT
28.	No. of Secondary Turns	Mfg. to give details	TEXT
29.	Current Density of Primary & Secondary Winding (max. - 1.6A/sq.mm)	max. 1.6A/sq.mm	TEXT
30.	Primary Terminal	30mm Dia. x 80mm length	TEXT
31.	Type of Insulation	Cycloaliphatic Epoxy Resin Cast	TEXT
32.	Whether Potential Transformer confirms to Temperature Rise limits	Yes, within permissible limits as per IS 16227(Part-1) 2016 & IS:16227(Part-3) 2015	TEXT
33.	Partial Discharge level	As per IS 16227(Part-1) 2016 & IS:16227(Part-3) 2015	TEXT
34.	Class of Insulation	Insulation Class B	TEXT
35.	Actual clearance between live part & ground (mm)	min. 370mm	TEXT

**Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type
Potential Transformers for Protection & Metering**

SCHEDULE 'A'

**Guaranteed Technical Particulars of
22kV Resin Cast (Cycloaliphatic) Dry Type
Potential Transformers (Protection & Metering)**

Sr. No.	Particular of GTP Parameter	MSEDCL Requirement	To be offered by the bidder
1.	Manufacturer's Name & address	Mfg. to give details	TEXT
2.	Manufacturer's Type Designation/Type of PT	Single Phase, Outdoor, Resin Cast (Cycloaliphatic) Dry Type PT	TEXT
3.	Type of Mounting	Pedestal Type	TEXT
4.	Equipment Conforming to Standards	16227(Part-1) 2016 & IS:16227 (Part-3) 2015	TEXT
5.	Rated Voltage/Highest System Voltage in KV	22kV/24kV	TEXT
6.	Rated Primary Voltage (kV)	22kV/ $\sqrt{3}$	TEXT
7.	Number of Secondary Windings	Two	TEXT
8.	Rated Secondary Voltage (Volt)	110V/ $\sqrt{3}$ -110V/ $\sqrt{3}$	TEXT
9.	Frequency (HZ)	50 HZ	TEXT
10.	Ratio of Potential Transformer	22kV/ $\sqrt{3}$ /110V/ $\sqrt{3}$ -110V/ $\sqrt{3}$	TEXT
11.	Details of Cores		
i)	Core Number (I & II)	I & II	TEXT
ii)	Purpose	I- Metering II-Protection	TEXT
iii)	Burden (VA)	50/50VA	TEXT
iv)	Class of Accuracy	0.2/3P	TEXT
12.	Method of Earthing system to be connected to	Solidly effectively earthed	TEXT
13.	Rated Voltage Factor	1.2 continuous & 1.5 for 30 seconds	TEXT
14.	One minute Dry Power Frequency Withstand Voltage (KV rms) of Primary Winding	50kVrms	TEXT
15.	One minute Wet Power Frequency Withstand Voltage (KV rms) of Primary Winding	50kVrms	TEXT
16.	1.2/50 micro-second Impulse Withstand Voltage (KVP)	125kVp	TEXT
17.	The die-electric Withstand values (KVP)of external & internal insulation	50kVrms/125kVp	TEXT
18.	One minute Power Frequency Withstand Voltage (KV rms) of Secondary Winding	3kVrms	TEXT
19.	Minimum Creepage Distance (mm)	600mm (min.)	TEXT
20.	Total Weight (KG)	Mfg. to give details	TEXT

Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type Potential Transformers for Protection & Metering

21.	Mounting details	350mmx350mm, Mounting Holes - Dia. 30mm	TEXT
22.	Overall dimension	Mfg. to give details	TEXT
23.	Type of Winding	Wound Type	TEXT
24.	Material of Winding	EC grade Copper	TEXT
25.	Size & Cross Section of Primary Winding	Mfg. to give details	TEXT
26.	Size & Cross Section of Secondary Winding	Mfg. to give details	TEXT
27.	No. of Primary Turns	Mfg. to give details	TEXT
28.	No. of Secondary Turns	Mfg. to give details	TEXT
29.	Current Density of Primary & Secondary Winding (max. - 1.6A/sq.mm)	max. 1.6A/sq.mm	TEXT
30.	Primary Terminal	30mm Dia. x 80mm length	TEXT
31.	Type of Insulation	Cycloaliphatic Epoxy Resin Cast	TEXT
32.	Whether Potential Transformer confirms to Temperature Rise limits	Yes, within permissible limits as per IS 16227(Part-1) 2016 & IS:16227(Part-3) 2015	TEXT
33.	Partial Discharge level	As per IS 16227(Part-1) 2016 & IS:16227(Part-3) 2015	TEXT
34.	Class of Insulation	Insulation Class B	TEXT
35.	Actual clearance between live part & ground (mm)	min. 450mm	TEXT

**Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type
Potential Transformers for Protection & Metering**

SCHEDULE 'A'

**Guaranteed Technical Particulars of
33kV Resin Cast (Cycloaliphatic) Dry Type
Potential Transformers (Protection & Metering)**

Sr. No.	Particular of GTP Parameter	MSEDCL Requirement	To be offered by the bidder
1.	Manufacturer's Name & address	Mfg. to give details	TEXT
2.	Manufacturer's Type Designation/Type of PT	Single Phase, Outdoor, Resin Cast (Cycloaliphatic) Dry Type PT	TEXT
3.	Type of Mounting	Pedestal Type	TEXT
4.	Equipment Conforming to Standards	16227(Part-1) 2016 & IS:16227 (Part-3) 2015	TEXT
5.	Rated Voltage/Highest System Voltage in KV	33kV/36kV	TEXT
6.	Rated Primary Voltage (kV)	33kV/ $\sqrt{3}$	TEXT
7.	Number of Secondary Windings	One	TEXT
8.	Rated Secondary Voltage (Volt)	110V/ $\sqrt{3}$	TEXT
9.	Frequency (HZ)	50 HZ	TEXT
10.	Ratio of Potential Transformer	33kV/ $\sqrt{3}$ /110V/ $\sqrt{3}$	TEXT
11.	Details of Cores		
i)	Core Number (I)	I	TEXT
ii)	Purpose	I- Metering	TEXT
iii)	Burden (VA)	50	TEXT
iv)	Class of Accuracy	0.2	TEXT
12.	Method of Earthing system to be connected to	Solidly effectively earthed	TEXT
13.	Rated Voltage Factor	1.2 continuous & 1.5 for 30 seconds	TEXT
14.	One minute Dry Power Frequency Withstand Voltage (KV rms) of Primary Winding	70kVrms	TEXT
15.	One minute Wet Power Frequency Withstand Voltage (KV rms) of Primary Winding	70kVrms	TEXT
16.	1.2/50 micro-second Impulse Withstand Voltage (KVP)	170kVp	TEXT
17.	The die-electric Withstand values (KVp)of external & internal insulation	70kVrms/170kVp	TEXT
18.	One minute Power Frequency Withstand Voltage (KV rms) of Secondary Winding	3kVrms	TEXT
19.	Minimum Creepage Distance (mm)	900mm (min.)	TEXT
20.	Total Weight (KG)	Mfg. to give details	TEXT

Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type Potential Transformers for Protection & Metering

21.	Mounting details	450mmx450mm, Mounting Holes – Dia. 30mm	TEXT
22.	Overall dimension	Mfg. to give details	TEXT
23.	Type of Winding	Wound Type	TEXT
24.	Material of Winding	EC grade Copper	TEXT
25.	Size & Cross Section of Primary Winding	Mfg. to give details	TEXT
26.	Size & Cross Section of Secondary Winding	Mfg. to give details	TEXT
27.	No. of Primary Turns	Mfg. to give details	TEXT
28.	No. of Secondary Turns	Mfg. to give details	TEXT
29.	Current Density of Primary & Secondary Winding (max. – 1.6A/sq.mm)	max. 1.6A/sq.mm	TEXT
30.	Primary Terminal	30mm Dia. x 80mm length	TEXT
31.	Type of Insulation	Cycloaliphatic Epoxy Resin Cast	TEXT
32.	Whether Potential Transformer confirms to Temperature Rise limits	Yes, within permissible limits as per IS 16227(Part-1) 2016 & IS:16227(Part-3) 2015	TEXT
33.	Partial Discharge level	As per IS 16227(Part-1) 2016 & IS:16227(Part-3) 2015	TEXT
34.	Class of Insulation	Insulation Class B	TEXT
35.	Actual clearance between live part & ground (mm)	min. 450mm	TEXT

Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type Potential Transformers for Protection & Metering

SCHEDULE 'B'

List of Type Test Reports to be enclosed with the offer

Sr. No.	Description of Type Test	Type & Make of Potential 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.
11/ 22 /33 kV Resin Cast (Cycloaliphatic) Dry Type Potential Transformers						
1.	Temperature Rise Test					
2.	Impulse Voltage Withstand Test on Primary Terminals					
3.	Wet Test for outdoor Type Transformers					
4.	Tests for accuracy					
5.	Short Circuit Withstand Capability					

Name of the firm_____

Signature of the bidder_____

Designation_____

Date_____

**Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type
Potential Transformers for Protection & Metering**

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 firm_____

Signature of the bidder_____

Designation_____

Date_____

Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type Potential Transformers for Protection & Metering

SCHEDULE 'D'

Schedule of Bidder's Experience

Bidder shall furnish here a list of similar orders executed/under execution by him to whom a reference may be made by Purchaser in case he considers such a reference necessary.

Sr. No.	Name of Client & Description order	Value of order along with size & qty	Period of supply and commissioning	Name & Address to whom reference may be made
1.				
2.				
3.				
4.				
5.				
6.				
7.				

Name of the firm_____

Signature of the bidder_____

Designation_____

Date_____

**Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type
Potential Transformers for Protection & Metering**

SCHEDULE 'E'

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 firm_____

Signature of the bidder_____

Designation_____

Date_____

**Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type
Potential Transformers for Protection & Metering**

SCHEDULE 'F'

**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 _____

Technical Specification of 11KV, 22KV & 33KV Outdoor Resin Cast (Cycloaliphatic) Dry Type Potential Transformers for Protection & Metering

SCHEDULE 'G'

Proforma of Undertaking

We hereby confirm that 11/ 22 /33 kV Resin Cast (Cycloaliphatic) Dry Type Potential Transformers offered by us against this tender are of the same design and type as have been supplied to M.S.E.D.C.L. against earlier order No. _____ dtd. _____ and all the Type Test Reports thereof were approved by Chief Engineer (Testing & QC Cell) vide letter No. _____ dtd. _____ (copy enclosed.)

We further confirm that the said Type Test have been carried out at _____ within five years prior to the date of opening of present tender.

SEAL AND SIGNATURE OF BIDDER