1. **33 & 11 kV Outdoor Type Potential Transformer**

1. **INTRODUCTION**

This chapter covers specification of 33kV and 11kV Potential Transformer suitable for outdoor service. Any other parts not specifically mentioned in this specification but otherwise required for proper functioning of the equipment should be included by the tender in the offer.

1. **APPLICABLE STANDARDS**

Unless otherwise modified in this specification, the Potential Transformer shall comply with the latest version of relevant standards (IS 3156, IS 2099, IS 5621, IS 335, IS 13947(Part I), IEC 186, Indian electricity Rules 2003, IEC 815) or better international standards. This list of standards is for guidance only. The contractor shall be solely responsible to design & manufacture the PT suitable for 33 kV/11kV systems.

1. **AMBIENT CONDITIONS**

The PT supplied against this specification shall be suitable for satisfactory continuous operation under the tropical conditions as detailed in general technical requirement.

1. **SYSTEM PARTICULARS**
2. Nominal System Voltage 33kV 11kV
3. Highest system Voltage 36kV 12kV
4. Rated Frequency 50Hz 50Hz
5. No of phases Three Three
6. System neutral earthing ---Solidly Earthed--
7. One minute Power Freq. 70kV 28kV  
    Withstand voltage (rms)
8. Lighting Impulse withstand Voltage 170kVp 75kVp
9. System fault level ---25 kA for 3sec---
10. **TECHNICAL PARAMETERS OF PT**
11. Rated primary Voltage 36 KV 12 KV
12. Type Single phase potential transformer
13. Voltage/ Ratio(kV) 33/0.11 11/0.11
14. Rated voltage factor 1.2continuous 1.5 – 30seconds-
15. One minute power freq. Withstand voltage for

Primary Terminals 70 kV(rms) 28 kV

Secondry winding 36 kV 12 KV

1. Min. Creepage Distance 25 mm/kV of Highest System Voltage
2. Detail of secondaries Core I Application Metering

Accuracy 0.5 0.5

Burdan (VA) 100 100

**Note:** The ratings indicated for instrument transformer are tentative only and may be changed to meet the requirements.

1. **PORCELAIN HOUSING**

It shall be single piece of homogeneous, vitreous porcelain of high mechanical & dielectric strength. It will be glazed with uniform Brown or Dark brown colour with smooth surface finish. The creepage distance for the porcelain housing shall be at least 25mm per kV.

The contractor shall clearly detail in his bid the details of attaching the metallic flange to porcelain, pressure release valve and also how primary & secondary terminals shall be brought out.

1. **WINDING**

**PRIMARY WINDING**

It shall be made of insulated electrolytic copper wire. The neutral end of the winding shall be brought outside for earthing.

The primary terminal shall be of standard size of 30 mm dia x 80 mm length of heavily tinned (min. thickness 15 micron) electrolytic copper of 99.9 % conductivity.

**SECONDARY WINDING**

It shall be made of insulated copper wire of electrolytic grade. The terminal box shall be dust free & vermin proof. The size of the terminal box shall be big enough to enable easy access and working space with the use of normal tools.

The secondary terminals studs shall be provided with at least 3 nuts and two plain washers. These shall be made of brass duly nickel plated. The min. stud outer dia shall be 10 mm & length 15 mm. The min spacing between the centres of the adjacent studs shall be 1.5 time the outer dia of the stud.

**POLARITY**

The polarity shall be marked on each PT at the primary and secondary terminals.

1. **TANK & HARDWARES**

It shall be fabricated of MS steel sheet of min. 3.15 mm for sides & 5 mm for top & bottom. The tank will be finished with min. 2 coats of zinc rich epoxy paint externally. The inner surface shall be painted with oil resistance white enamel paint.

All ferrous hardwares, exposed to atmosphere shall be hot dipped galvanized.

1. **INSULATION OIL**

The first filling of oil in PT shall be in contractor’s scope. The oil shall be as per IS 335.To ensure prevention of oil leakage, the manufacturer will give following details supported by drawings:

1. Location of emergence of Primary & Secondary terminals
2. Interface between porcelain & metal tanks
3. Cover of the secondary terminal box

Any nut & bolt and screw used for fixation of the interfacing porcelain bushing for taking out the terminals shall be provided on flanges cemented to the bushings & not on the porcelain.

If gasket joints are used, Nitrite Butyl Rubber gasket shall be used. The grooves shall be in machined with adequate space for accommodating gasket under pressure.

The PT shall be vacuum filled with oil after processing. It will be properly sealed to eliminate breathing & to prevent air & moisture from entering the tank. The sealing methods/arrangement shall be described by the contractor & be approved by the owner.

1. **OIL LEVEL INDICATOR**

The PT shall be fitted with prismatic type oil sight window at suitable location so that the oil level is clearly visible with naked eye to an observer standing at ground level.

To compensate oil volume variation due to temperature variation, Nitrogen cushion or the stainless steel bellows shall be used. Rubber diaphragms are not permitted for this purpose.

1. **EARTHING**

Two earthling terminals shall be provided on the metallic tank of size 16 mm dia & 30 mm length each with one plain washer & one nut for connection to the station earth mat

1. **Junction Box**

The junction box shall be of MS sheet having thickness of 2mm, synthetic enamel painted as per procedure mentioned in General technical Requirement (Min. thickness 55 micron). The shade of junction box shall be 697 of IS: 5. Disconnecting type terminal blocks for PT secondary lead shall be provided. The junction boxes shall be weather proof type with gaskets as per section-I (Introduction and general technical requirements) conforming to IP-55 as per IS-13947 (Part-I).

One junction box shall be provided for 3 numbers of single phase CT’s and PT’s.

1. **LIFTING & MOUNTING ARRANGEMENT**

The PT shall be provided with two lifting eyes to lift the PT. This shall be so positioned so as to avoid any damage to the PT during lifting for installation or transportation purpose. This shall be detailed in General Arrangement drawing.

The PT shall be of pedestal mounting type suitable for outdoor installation on steel/cement concrete structures. All the clamps, bolts, nut and washers etc. required for mounting the PT on the structure shall be supplied along with the PT and shall be galvanized. The contractor shall supply all the terminal connectors etc. required for connection to the PT.

1. **TESTING**

All Type and Routine Tests shall be as per relevant IS and /or IEC.