**TECHNICAL SPECIFICATION OF 33 KV PILFER RESISTANT METERING CUBICLE (0.2S ACCURACY)**

* 1. **GENERAL**

This specification covers the design, manufacture, testing, inspection and supply of 33kV Indoor Type Metering Cubicle (0.2s Accuracy) made of M.S. sheet.

* 1. The metering cubicle shall be totally enclosed, air insulated, dust and vermin proof having two separate compartments H.T. & L.T. covered with two separate hinged doors.

The 33 KV metering cubicle shall comply with the requirement of Indian Electricity Rules 1956.

* 1. The metering cubicle shall be supplied with three nos. 33kV single phase C.T.’s (0.2s Accuracy), three nos. 33kV single phase PT (0.2s Accuracy) and connecting strips and support of 33kv cable, CT’s and PT’s with necessary clamping arrangement.
  2. All the equipment shall comply with the requirements of the relevant IS specifications.

### CONSTRUCTION:

* 1. The 33kv Metering Cubicle shall be fabricated with M.S. sheet having thickness not less than 2.0 mm. The dimension of the cubicle shall be approximately 1800mm. (height) X 1550mm (Length) X 1550 mm (Depth). These dimensions may vary slightly as per design of the manufacture taking into care the minimum clearances of 320 mm between two phases as well as between phase to earth. In case minimum clearances are not possible, these dimension can be increased on higher side.
  2. All the edges and joints shall be made and welded in such a way that no access inside the cubicle shall be possible through them and shall thus provide strength to robust mechanical structure both for transportation and installation for its use.
  3. The metering cubicle shall be totally enclosed one and shall be provided with two nos. hinged doors made of M.S. sheet of thickness not less than 2.00 mm and shall rest on the collars along the four sides of the cubicle so that the doors remain flushed with the body of the cubicle.
     1. The hinges of the doors shall be concealed type (welded from inside) so as to eliminate any chance of dehinging without causing any damage to the cubicle.

2.3.2. Two Nos. doors shall be provided with synthetic / semi synthetic gasket to make it dust & vermin proof.

2.3.3 Each door shall be provided with a handle and separate one no. one locking and two nos. sealing arrangements.

* 1. The metering cubicle shall rest upon two nos. M.S. channel support of approximate size 100 mm x 50 mm x5 mm welded at bottom along its breadth.
     1. Each of these supporting channels shall have suitable arrangement for foundation bolts at two places thereby making hole of 12 mm dia for the foundation bolts, which shall be tightened by means of nuts provided inside the cubicle.
     2. The metering cubicles shall be provided with M.S. Earthing strip of size 50mm x5mm welded at the two opposite base angles provided. With welded nuts of 6 mm dia welded from inside the cubicle. The earthing strip can be connected by tightening a bolt from outside the metering cubicle at two opposite ends.
  2. The surface of the metering cubicle shall be cleaned suitably and made smooth and shall be provided with two coats of gray colour epoxy powder coating on the outside and two coats of white colour epoxy powder coating inside cubicle as well as that on doors.
  3. The metering cubicle shall have two separate compartments, separated by M.S. sheet of 2.0 mm thickness as given below:

### UPPER (LT) COMPARTMENT:

The upper compartment of the metering cubicle shall be called LT compartment and shall have approximate minimum height of 550mm.

The compartment shall house a tri-vector meter and also a check energy meter (both not in scope of supply) alongwith its associated wiring.

* + - 1. For fixing of KWH tri-vector meter and check energy meter in this compartment two nos. slotted channel of 25x25x2mm size shall be welded vertically at their two opposite ends and similarly two nos. slotted channel of the same size shall be placed horizontally, so that the horizontal channel can be bolted at desired heights for installing the meter inside the cubicle.
      2. There shall be one window (approx. size 300x200mm) fitted with transparent toughened glass (fixed with araldite), protected by providing wire mesh (approx. square 25mm) over it. The glass shall be fitted within channel from inside of window. The height of window shall be such so as to have the meters reading at or below eyes level. The window shall be provided with a proper sealing arrangement.
      3. The LT compartment shall essentially contain the following:

Hanger of slotted channels for mounting main meter and check meters for having flexibility for mounting of meter vertically & horizontally, (Meter not in scope of this supply).

* + - 1. There should be provision for fixing of any standard make modem for IAMR (Integrated Automatic Meter Reading) in the LT Compartment.

### LOWER (HT) COMPARTMENT:

The lower compartment of metering cubicle shall be called HT compartment and shall have approximate height of 1250 mm.

* + - 1. This compartment shall house 3 nos. 33kV single phase CT’s, for R,Y, B phases and 3 Nos. 33kV single phase PT cable connecting strips between 33kv CT’s, PT’s, Bus bar and suitable clamping arrangement for two nos. 33kV XLPE cables (one each for incoming and outgoing side).
      2. The compartment shall be provided with one no. hinged door, which shall rest on the collar of the M.C. such that it becomes complete dust- proof & vermin proof. The door shall be provided with a separate one no. locking and two nos. sealing arrangements.
      3. The compartment should be provided with 2 nos. cable entries with detachable plate of size 250mmx 250mm at the bottom, suitable for 33kv XLPE cable of maximum size 120 sq. mm.

The HT compartment shall essentially contain the following:

1. 33kv current transformer (single phase) - 3Nos.
2. Potential transformer (single phase) -3 Nos.
3. Bus bar to connect CTs (CT terminals) -1 Set
4. Flexible copper flat strip of 20x3mm -1Set or 8 SWG copper wire to connect the

CT/ bus bar and PT

1. LT wiring for the secondary of the PT & CT circuits -1 Set
   1. A plate of suitable size shall be provided on the outside of the cubicle which have the following information to be engraved on the plate.

**UTTARAKHAND POWER CORPORATION LIMITED**

Name of the consumer Service Connection No. Sanctioned Load

Date of release of connection Type of load cont. / Non cont. Meter No. & Make

Line CTR/PTR Meter CTR/PTR

Class of accuracy of CTs Class of accuracy of PTs CT/PT MF.

Dial factor for energy/ For demand

Overall MF: For Energy/ For Demand

Date of last checking

In addition to the above CT and PT ratios and their class of accuracy shall be painted/ engraved on the front side of the panel by the supplier. The information regarding the suitability of the cubicles for loads as given below shall also be indicated by paint/ engraving in bold letters.

Suitable for load from to ----------to MVA as per following CT ratio limits: -

50/1A from 1.5 MVA to 3.0 MVA

100/1A from 3 MVA to 6.0 MVA

### ELECTRICAL COMPONENT

A brief detail of the various components to be provided in the metering cubicle is given below:-

### CURRENT TRANSFORMERS

There shall be three Nos. single core single ratio dry type Epoxy coated resin cast current Transformers as per IS: 2705:1992 of latest revisions thereof as per details mentioned below: -

TYPE: - Dry type epoxy coated resin cast CTs.

Capacity 50/1A or 100/1A (CT ratio with quantity shall be informed later)

1. Rated Voltages 33kV
2. No. of cores One
3. Rated output 10 VA
4. Rated continuous thermal as per IS:2705:1992 Current temperature rise

Over ambient

1. One minute withstand power As per ISS Frequency voltages

(for primary & secondary)

1. Class of accuracy 0.2S
2. Material
   1. Core High grade non- ageing electrical low loss core of superior CRGO Silicon sheet steel.
   2. Conductor Super enameled copper wire
   3. insulation Resin cast
   4. Base MS Hot dip galvanized
   5. Secondary Firm and effective termination S1 & S2 termination shall be clearly marked.

Fault Level as per special conditions clause 1.16

The current transformers should be type tested and routine tested as per IS:2705/1992 or latest amendment thereof.

1. Class of insulation B
2. Minimum weight of CT shall be 17 Kg.
3. CT should have trade mark of the manufacturer embossed there on.

### POTENTIAL TRANSFORMERS

There shall be three nos. single phase, potential transformer (one per phase). These will be dry type Epoxy Coated Resin cast, air cooled conforming to IS: 3156/1992 or latest amendment thereof. The PTs shall have a ratio of and with a rated burden of 25 VA, accuracy class 0.2 and insulation class-B. They will be connected in star-star for phase to phase voltage ratio of 33KV/110V. There will be no HT fuses in the primary side and secondary side of the potential Transformers. Rated voltages factor of PT should be as per ISS. Potential transformers should be routine tested and type tested as per IS 3156/1992 or latest version thereof. The PT shall have minimum weight of 35 Kgs.

**3.3** **INSULATORS**

The insulators required for all bus bar supports shall be of epoxy resin cast, indoor type. The hardware used shall be electroplated MS. The insulators shall be conforming to relevant ISS.

### BUS BARS

The connecting strips between HV cables and current transformers shall be of copper conforming to relevant ISS of size 50x6 mm. These shall be two nos. one for incoming and other for outgoing current transformer. There shall be one bus bar of copper supported on epoxy resin cast insulator supports for the middle (‘Y’) phase. These bus bars shall have minimum clearances of 320 mm from phase to phase and phase to earth.

### PT LINKS

The bus bar and HT side of the PT shall be connected through a flexible copper strip of size 25x3mm or 8SWG copper wire such that HT terminals of PT’s are not subjected to any compression or tension forces.

### LT WIRES

The LT wiring shall be done with PVC insulated flexible copper wire of x- section not less than 6 sq. mm**.** of reputed make, conforming to relevant ISS. These will be provided with lugs and far rules at termination in the LT compartments, suitable colour coded, PVC insulated flexible copper (without joints) will be neatly bunched and dressed. These wires shall connect secondary of CTs and PTs. Proper code and numbers should be marked on far rules for individual CT & PT connection.

**5.0 PAINT:**

Epoxy paint of standard make**.**

### INSPECTION AND TESTING

All Cubicle shall be inspected and tested at manufacturer works to verify that these are being supplied in accordance with relevant standards. Technical Specification, Guaranteed Technical Particulars and acceptance and routine tests.

Inspection of material offered for inspection shall be carried out jointly by the representative of Superintending Engineer (DQC), PVVNL, Meerut.

While offering for inspection / testing confirming to the effect that the cubicle have successfully withstand the routing tests (along with test results) is required to be submitted for each lot offered for inspection Superintending Engineer (DQC), PVVNL, Meerut.

All inspection used in inspection and testing should be properly calibrated and sealed once a year. Calibration certificate when demanded by the inspecting officer shall be provided / produced for verification purpose. In case of any dispute regarding calibration, instruments shall be sealed and singed by the representative of the supplier and purchaser and will be sent to test house / Govt. Lab / Govt. institution of repute, for calibration at the cost of supplier. The result of such testing shall be binding on the supplier.

Purchaser reserves the right to get the components like CT's / PT's etc. inspected / type tested before dispatch by any independent inspection agency at the cost of purchaser in case the equipment with stand the type test, otherwise the supplier has to bear such cost in addition to any other action deemed appropriate by the purchaser.

One sample of CT of any ratio randomly selected from each offered lot, shall be opened for verifying the diameter & cross sectional area of primary coil conductors including verification of GTP

**Testing Facility: -** The manufacturer must have testing facilities at their works as per clause No. 1.2.3 of "Instruction to Tenderer" to carry out all the routine & acceptance test (including partial discharge test) as mentioned below. List of Testing equipment with photo copy of calibration certificates should be enclosed with Part- II of the tender. Schematic drawing showing each and every details, dimensions and wiring diagrams shall be submitted necessary for each type of metering cubicle.

* 1. **Type test:** All the type tests as listed below shall be carried out for each type of equipment strictly and described as per relevant ISS (or latest amendment thereafter).

**Current Transformers (As per IS:2705/1992 or its latest Amendment)**

* + 1. Determination of error according to the requirements of accuracy class.
    2. Short time current test.
    3. Temperature rise test.
    4. Lightning Impulse Test.

# Potential Transformers: (As per IS:3159/1992 or its latest amendment:

1. Determination of error according to the requirements of accuracy class.
2. Temperature rise test.
3. Lightning Impulse Test.
   1. **Routine Tests:-** The following shall constitute the routine tests and acceptance tests.

### Current Transformers

* + - 1. Verification of terminal markings and polarity.
      2. High Voltage power frequency test on primary windings.
      3. High voltage power frequency test on secondary windings.
      4. Over voltage inter turn test.
      5. Determination of error according to the requirements of appropriate accuracy class.
      6. Partial discharge test in accordance with IS:11322/1985.

#### Potential Transformers:

* + - 1. Verification of terminal markings and polarity
      2. Power frequency dry withstand test on primary windings.
      3. Power frequency dry withstand test on secondary windings.
      4. Determination of error according to the requirements of appropriate accuracy class
      5. Partial discharge test in accordance with IS: 11322/1985.

### Acceptance Tests:

* + 1. Dimensional check of metering cubicle.

#### Current Transformers

* + - 1. Verification of terminal markings and polarity
      2. High Voltage power frequency on primary windings.
      3. High voltage power frequency on secondary windings.
      4. Determination of error according to the requirements of appropriate accuracy class
      5. Temperature rise test.
      6. Partial discharge test

#### Potential Transformers

* + - 1. Verification of terminal markings and polarity
      2. High Voltage power dry withstand test on primary windings.
      3. High voltage power dry withstand test on secondary windings.
      4. Determination of error according to the requirements of appropriate accuracy class
      5. Temperature rise test
      6. Partial discharge test

### GUARANTEED TECHNICAL PARTICULARS OF 33 kV PILFER RESISTANT METERING CUBICLE (0.2S ACCURACY)

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| --- | --- | --- |
| **Sl. No.** | **Description** | **GTP** |
| **1** | **2** | **3** |
| **A** | **General** |  |
| 1 | Make of Cubicle |  |
| 2 | Thickness of M.S. Plate used for fabrication of cubicle  (mm) | 2.0mm |
| 3 | Over all dimensions of cubicle (mm) | 1800x1550x1550 ( ± 5%) |
| Height | 1800mm (+/- 5%) |
| Length | 1550mm (+/- 5%) |
| Depth | 1550mm (+/- 5%) |
| 4 | Is the Cubicle dust & vermin proof? | Yes |
| 5 | Details of arrangement for earthing of cubicle. | With the help of M. S. Earthing strip of size 50mm x 5 mm welded at two opposite side of the metering cubicle with  6mm nut welded from inside the cubicle |
| 6 | Size of Window (mm) | 300x200 |
| Width | 300mm |
| Height | 200mm |
| 7 | Size of wire mesh provided on windows (mm) | 25mm x 25mm (approx.) |
| 8 | Make and other details of insulator used for bus bar  support of yellow phase. | Not required as the CT in all the three  Phases |
| 8 | Size of connecting strip used between H. V. cables and  CT. | 50mm x 6mm |
| Metal/Alloy used for connecting strip | Copper |
| 9 | Minimum clearances: |  |
| Between HV Live part and earth(mm) | 320mm Min. |
| Between phases (mm) | 320mm Min. |
| 10 | Dimension of flexible link between bus bar & P. T. on H.  T. side | 25x3mm or 8SWG Copper Wire |
| Metal Ally used for flexible link | Copper Wire |
| 11 | Size of L. T. Wire used for connection of secondary of  CTs & PTs | 6.0 Sq. mm |
| 12 | Hardware (Make) | Reputed make |
| 13 | State Yes/No for the availability of sealing arrangement |  |
| Cubicle seal of L. T. Compartment | Yes |
| Cubicle seal of H. T. Compartment | Yes |
| Meter reading Window | As per technical specification Clause No.  2.6.1(b) |

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| --- | --- | --- |
| **Sl. No.** | **Description** | **GTP** |
| **1** | **2** | **3** |
| **B** | **Current Transformers** |  |
| 1 | Name of Manufacturer |  |
| 2 | Manufacturers Type | Dry type Epoxy coated resin cast,  Indoor Type |
| 3 | Name of the resin employed in manufacturing of CT | Epoxy Resin |
| 4 | Rated voltage | 33 kV |
| 5 | Rated Primary current | As per Ratio |
| 6 | Rated Secondary current | 1 Amp |
| 7 | Rated Secondary output | 10 VA |
| 8 | Class of Accuracy | 0.2S |
| 9 | Instrument security factor | As per ISS |
| 10 | Short time rating (1 Second) | As per ISS |
| 11 | Secondary Limiting Voltage | As per ISS |
| 12 | Rated Continuous thermal Current (also indicate temperature  rise over ambient temperature) | 1.2 times of rated primary current  =450C |
| 13 | Rated current dynamic (Peak value) | As per ISS |
| 14 | Power frequency withstand voltage on secondaries | As per ISS |
| 15 | 1/50 MS impulse withstand test voltage | 170 KV (P) |
| 16 | Power Frequency dry withstand test voltage | 70 kV |
| 17 | Class of insulation | B |
| 18 | Total minimum weight | 17 Kg |
| 19 | Overall dimensions: |  |
| Length | As per manufacture’s design |
| Width | As per manufacture’s design |
| Height | As per manufacture’s design |
| 20 | Secondary winding resistance of CT’s | As per ISS |
| 21 | The C.T of the offered Design Should have been type tested during last five years from the date of Opening of Part –I, it should be indicated that when and where were they type tested? |  |
| 22 | Details of test reports (to be enclosed with the tender with Part-I) |  |

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **Description** | **GTP** |
| **1** | **2** | **3** |
| **C** | **Potential Transformers** |  |
| 1 | Name of Manufacturer |  |
| 2 | Manufacturers Type & Designation | Epoxy Coated Resin Cast,  Indoor type |
| 3 | Name of the resin employed in manufacturing of PT | Epoxy |
| 4 | Rated Primary voltage | 33*kV*   3 |
| 5 | Rated Secondary Voltage | 110*V*   3 |
| 6 | Rated burden of Secondary | 25VA |
| 7 | Class of Accuracy | 0.2S |
| 8 | Temperature rise at 1.2 times of rated voltage with rated  burden | As per ISS |
| 9 | Temperature rise for (above) | As per ISS |
| 10 | Rated voltage factor & time | As per ISS |
| 11 | One Minute Power Frequency with stand test(Dry)  Voltage | 70 kV |
| 12 | 1/50 MS impulse withstand test voltage | 170 kV(p) |
| 13 | One Minute Power Frequency with stand Voltage on Secondary | As per ISS |
| 14 | Class of insulation | B |
| 15 | Total minimum weight | 35 Kg |
| 16 | Mounting Details | As per manufacture’s design |
| 17 | Overall dimensions: |  |
| Length | As per manufacture’s design |
| Width | As per manufacture’s design |
| Height | As per manufacture’s design |
| 18 | The P.T of the offered Design Should have been type tested during last five years from the date of Opening of Part-I, it should be indicated that when and where were they type tested? |  |