MAHARASHTRA STATE ELECTRICITY DISTRIBUTION COMPANY LTD.

TECHNICAL SPECIFICATION

FOR

36 kV
(PROTECTION CUM METERING)

INSTRUMENT TRANSFORMERS

FOR
VARIOUS SUBSTATIONS
IN

MAHARASHTRA

{(SPECIFICATION NO.: DIST/ MM/I/ 36 kV CT & PT/2008/R1(030311)}

SCHEDULE ' A'
(SPECIFICATION NO.: DIST/MM/I/ 36 kV CT & PT/2008/R1(030311)

INDEX

SCHEDULE ' A'
TECHNICAL SPECIFICATION FOR INSTRUMENT TRANSFORMERS
(SPECIFICATION NO.: DIST/MM/I/ 36 kV CT & PT/2008/R1(030311)

1.0 SCOPE:

1.1 This specification covers design, manufacture, assembly, testing at manufacturer's works, packing and delivery of outdoor instrument transformers for protection and metering services in 33 kV Sub-stations in Maharashtra State (India).

1.2 It is not the intent to specify completely herein all details of the design and construction of equipments. However, the equipment shall conform in all respects to high standards of engineering, design and workmanship mentioned in clause 4.0 and shall be capable of performing in continuous commercial operation up to the supplier's guarantee in a manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment, is not in accordance therewith.

1.3 The equipments offered shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of supplier's supply irrespective of whether those are specifically brought out in this specification and / or the commercial order or not.

2.0 SERVICE CONDITIONS:

2.1 Equipment to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.

2.1.1	Maximum ambient temperature in open air (°C):	50.00
2.1.2	Maximum ambient temperature in shade (°C)	45.00
2.1.3	Minimum temperature in shade(°C):	03.50
2.1.4	Relative humidity (%)	10 to 100
2.1.5	Maximum annual rainfall (mm)	1450
2.1.6	Maximum wind pressure (Kg/ Sqmtr.)	150
2.1.7	Maximum altitude above mean sea level (Mtrs)	1000
2.1.8	Isoceraunic level (days/year)	50
2.1.9	Seismic level (Horizontal acceleration)	0.3 g.
2.1.10	General nature of climate :	Moderately hot and humid tropical climate, conducive to rust and fungus growth.

3.0 STANDARDS:

Unless otherwise specified elsewhere in this specification, the rating, performance and testing of the instrument transformers and accessories shall conform to the latest revisions, of all relevant standards listed in Annexure-II (A & B).

4.0 PRINCIPAL TECHNICAL PARAMETERS:

The Current transformers and Voltage transformers covered in this specification shall meet the technical requirements listed in Annexure IIIA & IIIB respectively.

5.0 GENERAL TECHNICAL REQUIREMENTS:

5.1 COMMON FOR ALL INSTRUMENT TRANSFORMERS:

5.1.1. The insulation of the instrument transformers shall be so designed that the internal insulation shall have higher electrical withstand capability than the external insulation. The designed dielectrics withstand values of external and internal insulations shall be clearly brought out in the GTP (Guaranteed Technical particulars). The dielectric withstand values specified in this specification are meant for fully assembled instrument transformer. The temperature rise on any part of equipment shall not exceed the maximum temperature rise limits specified in annexure IV under the conditions specified there in.

5.1.2 PORCELAIN HOUSING:

5.1.2.1. The porcelain housing shall be of a single piece construction without any joint or coupling .The housing shall be made of homogeneous, vitreous porcelain of high mechanical and dielectric strength. Glazing of porcelain shall be of uniform brown or dark brown colour with a smooth surface arranged to shed away rainwater or condensed water particles (fog). The profile of porcelain shall be aerodynamic type as per IEC 815.

5.1.2.2. The vertical clearance of porcelain housing shall be at least 450mm.

5.1.2.3. Details of attachment of metallic flanges to the porcelain for pressure release valve, and primary / secondary terminals shall be brought out in the offer.

5.1.3 METAL TANKS:

5.1.3.1. The metal tanks shall have bare minimum number of welded joints so as

to minimize possible locations of oil leakage. The metal tanks shall be made out of mild steel. The thickness of the metal tank shall be more than 3.00 mm. Actual thickness provided shall be specified by the tenderer.

5.1.3.2. The bottom of the tank shall be adequately accessible for periodical maintenance of open surface.

5.1.4. SURFACE FINISH:

The metal tanks shall be coated with at least two coats of zinc rich epoxy painting. All the ferrous hardware, exposed to atmosphere, shall be hot dip galvanized. All other fixing nuts, bolts, washers in the electrical current path shall be made out of stainless steel.

5.1.5. INSULATING OIL:

Insulating oil required for first filling of the instrument transformer shall be covered in bidder's scope of supply. The oil shall meet the requirements of latest edition of IS- 335.

5.1.6. PREVENTION OF OIL LEAKAGES & ENTRY OF MOISTURE:

5.1.6.1. As specified elsewhere in this specification, the instrument transformer shall be guaranteed for a trouble free and maintenance - free performance for a period as specified. Therefore, the bidder shall ensure that the sealing of instrument transformer is properly achieved. In this connection the arrangement provided by the bidder at various locations including the following ones shall be described, supported by sectional drawings.

i) Locations of emergence of primary and secondary terminals.

ii) Interface between porcelain housing and metal tanks

iii) Cover of the secondary terminal box

5.1.6.2. Nuts and bolts or screws used for fixation of the interfacing porcelain bushings for taking out terminals shall be provided on flanges cemented to the bushings and not on the porcelain.

5.1.6.3. For gasket joints, wherever used nitrite butyl rubber gaskets shall be used. The gasket shall be fitted in properly machined groove with adequate space for accommodating the gasket under compression.

5.1.7. OIL LEVEL INDICATORS:

5.1.7.1. For compensation of variation in volume of the oil due to temperature variation, nitrogen cushion or Stainless Steel bellows shall be used. Rubber diaphragms shall not be permitted for this purpose.

5.1.7.2. Instrument transformer provided with nitrogen cushion for Compensation

of oil volume variation shall be provided 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. If metal bellow is used for the above purpose, a ground glass window shall be provided to monitor the position of metal bellow.

5.1.8. EARTHING:

Metal tank of the instrument transformer shall be provided with two separate earthing terminals for bolted connection to 50 mm x 8 mm MS flat to be provided by the purchaser, for connection to station earth-mat. The size of two numbers of earthing terminals shall be 16 mm dia x 30 mm length, HDG, with one plain washer and one nut.

5.1.9. Instrument transformers shall be provided with suitable lifting arrangement, to lift the entire unit. The lifting arrangement (lifting eye) shall be positioned in such a way as to avoid any damage to the porcelain housing, primary terminals or the tanks during the process of lifting for installation / transport. The general arrangement drawing shall show clearly the lifting arrangements provided such as lifting eye, lug, guides etc.

5.1.10. NAME PLATE:

The instrument transformer shall be provided with non-corrosive, legible nameplates, with the information specified in relevant standards, duly engraved / punched on it.

5.1.11. Mounting details for fixing the instrument transformer on purchaser's supporting structure shall be strictly in accordance with the mounting details shown in enclosed sketch No. 252.137-01 (R-1) for 36KV, Protection cum Metering CT and 252.147-01 for 36KV , Metering PT.

5.1.12. The terminal connectors required for connection of the instrument transformer to purchaser's bus bar shall be arranged by the purchaser.

5.1.13. Enamel, if used for conductor insulation, shall be either polyvinyl acetate type or amide type and shall meet the requirements of IS- 4800. Polyester enamel shall not be used. Double cotton cover, if used, shall be suitably covered to ensure that it does not come in contact with oil.

5.1.14. Oil filling and / or oil sampling cocks, if provided to facilitate factory processing, shall be permanently sealed before dispatch of the Instrument Transformers.

5.1.15. Test Tap shall not be provided.

5.2. CURRENT TRANSFORMER (C.T.):

5.2.1. The C.T. shall be of dead tank design and shall be so constructed that it can be easily transported to site within the allowable transport limitation, even in

horizontal position, if the transport limitation so demands. The C.T. shall be hermetically sealed and method of such sealing shall be detailed in the offer and shall be subject to the approval of the Purchaser.

5.2.2. The C.T. secondary terminals shall be brought out in a weatherproof terminal box. The terminal box shall be provided with removable gland plate and glands. The cable glands shall be suitable for 1100 volts grade 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.

5.2.3. Polarity shall be invariably marked in each primary and secondary terminal. Facility shall be provided for short circuiting and grounding of the CT secondary terminals inside the terminal box.

5.2.4. The CT shall be provided with a rating plate with dimensions and marking as per IS- 2705. The markings shall be punched and not painted. The serial number and code of the supplier shall also be punched on the tank to identify the unit in case of loss or damage to the rating plate.

5.2.5. The Current Transformer shall be vacuum filled with oil after processing and thereafter hermitically sealed to eliminate breathing and to prevent air and moisture entering into the tank. Oil filling and / or oil sampling cocks, if provided to facilitate factory processing should be permanently sealed before dispatching the CT. The method adopted for hermetic sealing shall be described in the offer.

5.2.6. The casting of base collar etc. shall be die-cast and tested before assembly to detect cracks and voids if any.

5.2.7. The instrument security factor of metering core shall be low enough, but not greater than 5. This shall be demonstrated on all the ratios of metering core in accordance with procedure specified in IEC-185 or IS-2705.

5.2.8 PRIMARY WINDING:

5.2.8.1 Primary winding shall be bar type or wound type made out of high conductive copper. Specific reasons for selection of particular metal / alloy and its merits shall be clearly brought out in the offer. Conductors used for the primary winding shall be rigid or housed in rigid metallic shell. Unavoidable joints in the primary winding shall be welded type. The details of such welded joints shall be indicated in the drawings submitted with the offer. For primary winding, current densities shall not exceed the limit 1.65 A/Sq.mm. for highest current ratio i.e.400 A.

The design density for short circuit current as well as conductivity of the metal used for primary winding shall meet the relevant requirement of IS-2705.

The tenderer shall, in his offer furnish detailed calculations for selection of winding cross sections.

The cross section area of primary winding , cross section area of secondary winding, number of primary turns , number of secondary turns , current density etc. shall be mentioned by the tenderer.

5.2.8.2 The primary winding shall be designed for extended primary current at 120% of rated primary current.

5.2.9 SECONDARY WINDING:

Suitably insulated copper wire of electrolytic grade shall be used for secondary windings. Type of insulations used shall be described in the offer. For multi-ratio design, the multi-ratio shall be achieved by reconnection of the secondary windings.

5.2.10. The excitation current of the CT shall be as low as possible. The tenderer shall furnish, along with his offer, the magnetizing curves for all the cores.

5.2.11. PRIMARY TERMINALS:

Each 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.

5.2.12. SECONDARY TERMINALS:

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.

5.2.13. The current transformer shall be provided with CT ratio changing facility on secondary side only.

5.2.14. 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 5 % to120% of rated current in case of metering CTs and up to accuracy limit factor / knee point voltage in case of protection CTs.

5.2.15. Expansion chamber at the top of porcelain insulator should be suitable for expansion of oil.

5.2.16. Following accessories / fittings shall, but not restricted to, be supplied along with the Current Transformers.

(i) Pressure release device.
(ii) Oil level indicator.
(iii) Lifting lugs.
(iv) The CT shall be so constructed that it can be easily transported to the site within the allowable transport limitations even in horizontal position, if the transport limitations so demand.

5.3 POTENTIAL TRANSFORMER (PT):

5.3.1 The PT shall be vacuum filled with oil after processing and hermetically sealed to eliminate breathing and to prevent air and moisture entering the tanks. Method adopted for hermetic sealing shall be described in the offer and shall be subject to approval of the purchaser.

5.3.2 The PT shall be so constructed that it can be easily transported to site within the allowable transport limitations, even in horizontal position, if the transport limitations so demand.

5.3.3 PRIMARY WINDING:

5.3.3.1. Primary winding shall be made of suitably insulated electrolytic copper wire. Type of insulation used shall be described in the offer.

5.3.3.2. The rating and the diagram plates specified elsewhere in this specification should also indicate the above reconnection arrangement.

5.3.4 SECONDARY WINDING:

5.3.4.1 Suitably insulated copper wire of electrolytic grade shall be used for secondary windings. Type of insulation used shall be described in the offer. The secondary windings of the PT shall be protected by HRC fuses for each core separately.

5.3.4.2 The PT secondary terminal shall be brought out to a weatherproof terminal box. The HRC fuses meant for protection of secondary winding shall also be located in the terminal box. The terminal box shall be provided with removable gland plate and glands suitable for 1100 volts grade PVC insulated, PVC sheathed multi-core 2.5 sq.mm. to 10 sq.mm. stranded copper conductor cable. The terminal box shall be dust and vermin proof. Suitable arrangement space heater shall be provided for drying the air inside the terminal box. The dimensions of the opening of terminal box shall be adequate to enable easy access and working space with the use of normal tools.

5.3.4.3 Polarity shall be invariably marked at the secondary terminals in the terminal box.

5.3.5. The PT shall be provided with a rating plate with dimensions and markings as per IS- 3156. The markings shall be punched and not painted.

5.3.6. PRIMARY TERMINALS:

The primary terminal shall be of size 30 mm dia x 80 mm length for all PTs. The primary terminal shall be of heavily tinned electrolytic copper of 99.9% conductivity. The minimum thickness of tinning shall be 15 microns.

5.3.7 SECONDARY TERMINALS:

For external connection of secondary windings, terminal studs shall be provided with at least 3 nuts and adequate plain and spring washers. The studs, nuts and washers shall be of brass properly nickel-plated. The size of stud shall be 6 mm outside dia. A length of at least 15 mm shall be available on the studs for inserting the leads. Horizontal spacing between the centers of adjacent stud shall be at least 1.5 times the circum dia of the nuts.

6.0. TESTS

6.1. TYPE TESTS:

6.1.1. The tenderer shall furnish detailed type test reports of the offered material/ equipment as per Annexure-I of the Technical Specifications for CT/PT at the NABL approved laboratories to prove that the material/ equipment offered meet the requirements of the specification. These Type tests should have been carried out within five years prior to the date of opening of this tender. However, the tenderers who have supplied the material/ equipment to M.S.E.D.C.L against purchase orders shall be exempted from submission of type test reports against this tender, provided.

i) The offered current transformers are already fully type tested at Laboratories accredited by the National Accreditation Board of Testing and Calibration Laboratories (NABL) within five years prior to the date of opening of the tender.

ii) There is no change in the design of type tested material/ equipment and those offered against this tender.

iii) Such tenderers complying (i) and (ii) above shall furnish an undertaking in the format scheduled ‘F’ enclosed herewith.

The detailed type test reports along with the certified drawings etc. or undertaking seeking exemption from their submission in the format schedule ‘F’, are to be submitted along with the offer**.**

The purchaser reserve the right to demand repetition of some or all the Type Tests in presence of purchaser's representative at purchaser's cost. For this purpose, the tenderer shall quote unit rates for carrying out each Type Test. However, such unit rates will not be considered for evaluation of the offer. In case the unit fails in the type tests, the complete supply shall be rejected. The successful tenderer shall take approval/waiver of type tests from C.E. (Dist.), M.S.E.D.C.L. Mumbai, prior to commencement of supply.

6.1.2. In case these type tests are conducted earlier than five 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.

6.1.3. The Purchaser reserves the right to conduct tests included in the list of type tests as per IS on requisite number of samples / items from any of the lots during the tenure of the supply at purchaser's cost in the presence of Purchaser's representative. If the equipment / material do not withstand the type test, then the equipment / material supplied till then will be liable for rejection. The supplier, in such an eventuality shall be allowed to modify the equipment and type test the same again at his cost in the presence of the purchaser's representative. These type tests shall however be conducted by the supplier within a reasonable time. After successful passing of the type tests, all the equipments / material supplied earlier shall be modified in the line with equipment / materials which has successfully passed the type test. In case supplier fails to carry out the type test within reasonable time or does not agree to carry out the type test at his cost, his equipment / materials supplied earlier shall be rejected and order placed shall be cancelled and payments made earlier for these suppliers shall be recovered by the purchaser.

6.2 ACCEPTANCE AND ROUTINE TESTS:

6.2.1 All acceptance and routine tests as stipulated in the relevant standards shall be carried out by the supplier in presence of purchaser's representative.

6.2.2 Immediately after finalization of the programme of type / acceptance / routine testing, the supplier shall give three weeks advance intimation to the purchaser, to enable him to depute his representative for witnessing the tests.

7.0 INSPECTION:

7.1 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 / manufactures for unrestricted inspection of the works, raw material, and manufacture of all the accessories and for conducting necessary tests as declared herein.

7.2 The supplier shall keep the purchaser informed, in advance, of the time of starting and of the progress of manufacture of equipment in its various stages so that arrangement should be made for inspection.

7.3. No material shall be dispatched from its point of manufacture unless the material has been satisfactorily inspected and tested.

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

8.0. QUALIFYING REQUIREMENTS:

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

9.0. QUALITY ASSURANCE PLAN:

9.1. The tenderer shall invariably furnish the following information along with his offer, failing which his offer shall be liable for rejection. Information shall be separately given for each type instrument transformer.

i) Statement giving list of important raw materials, including but not limited to:

a) Conductor

b) Insulation

c) Core

d) Porcelain

e) Oil

f) Sealing material

g) Insulated wire

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.

(ii) Information and copies of test certificates as in (i) above in respect of bought out accessories.

(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, oil leakage testing facility, facility for testing tan- delta of insulation at rated voltage etc. are available as in house testing facilities or hired services.

(iv) Level of automation achieved and list of areas where manual processing still exists.

(v) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.

(vi) Special features provided in the equipment to make it maintenance free

(vii) List of testing equipments available with the bidder for final testing of instrument transformer and test plant limitation, if any, vis-a-vis the type, special, acceptance and routine tests specified in the relevant standards and the tests listed in Annexure- I.

9.2 The successful tenderer 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) Type 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.

9.3. The successful tenderer shall submit the routine test certificates of bought out accessories at the time of routine testing of the fully assembled instrument transformer. The successful bidder shall also be required to submit copies of central excise gate passes for raw material viz., oil, copper, aluminium, insulating material, core material etc.

10.0. PERFORMANCE GUARANTEE:

The equipment 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 good the faulty equipment at no extra cost to the purchaser.

11.0. DOCUMENTATION:

11.1. All drawings shall conform to international standards organisation (ISO) 'A' series of drawing sheet / Indian Standards specification IS-656. All drawings shall be in ink and suitable for microfilming. All dimensions and data shall be in System International Units.

11.2. List of drawings and documents

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

a) General outline and assembly drawings of the equipments.

b) Graphs showing the performance of equipments in regard to Magnetization characteristics.

c) Sectional views showing -

(i) General constructional features of the instrument transformer and dimensions of conductor, depth of insulation, clearance between paper insulation and the inside of porcelain, grading stages used for primary insulation, whether and how a semi conducting tape is used to cover metal foils etc.

(ii) The Sectional view shall show the materials / gaskets / sealing used for perfect hermetic sealing and arrangement for compensation of oil volume variation.

(iii) The insulation, the winding arrangements, method of connection of the primary / secondary winding to the primary / secondary terminals etc.

(iv) Porcelain housing used and its dimensions along with the mechanical and electrical characteristics, as well as volume of oil.

d) Arrangement of secondary terminal box and details of connection studs provided.

e) Name plate.

f) Schematic drawing.

g) Type test reports in case the equipment 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.

j) Pressure release device / SS Bellow, Note on PRD & SS Bellow.

k) Oil level indicator.

l) Drain plug.

m) Bushing Drawing.

11.3. The successful bidders shall submit three sets of final versions of all the above said drawings in line with technical specifications & drawings (Annexure-V) attached for purchaser's approval after placement of LOI. 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 (Dist) shall convey the drawing approval to material Management Cell with in reasonable period.

11.4. Adequate copies of acceptance and routine test certificates, duly approved by the purchaser, shall accompany the dispatched consignment.

11.5. The manufacturing of the equipments 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 equipment prior to the approval of the drawing shall be at the supplier's risk.

11.6. One set of nicely printed and bound volume of operation, maintenance and erection manuals in English language per instrument transformer of each voltage rating shall be submitted by the supplier to respective stores 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 instrument transformer. The manual shall also contain a set of all the approved drawings, type test reports etc.

11.7. Approval of drawings / work 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 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 therewith.

12.0. PACKING AND FORWARDING:

12.1. The equipments 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 during transit 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.

12.2. 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.

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

13.0. SCHEDULES:

13.1. 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.

1. Guaranteed technical particulars of the instrument transformers.

2. Schedule - 'C ' - Bidder's Experience.

3. Schedule – 'F' - Proforma of Undertaking

13.2. The tenderer 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 tenderers experience (Schedule "C") to enable the purchaser to evaluate the tender. In case the equipments are being designed and manufactured in collaboration with other manufacturer, the following additional information shall be submitted by the tenderer along with his offer.

(i) Copy of collaboration agreement executed between the tenderer 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.

ANNEXURE-I

List of type tests (Current Transformer)*

Sr.No.	Particulars
	As per IS 2705 (I-IV)/1992
1)	Short time current tests.
2)	Temperature rise test.
3)	Lightning impulse test for service in electrically exposed installation.
4)	High voltage power frequency wet withstand voltage test
5)	Determination of error or other characteristics secondary to the requirements of the appropriate designation or accuracy class.

List of type tests (Potential Transformer)*

Sr.No.	Particulars
	As per IS -3156(I-III)/1992
1)	Lightning impulse voltage withstand test.
2)	High voltage power frequency wet withstand voltage test.
3)	Temperature rise test.

* see clause No.6.1.1.

ANNEXURE-II-A
CURRENT TRANSFORMERS

LIST OF STANDARDS

Sr.No.	Standard No.	Title
1)	IS-2165	Insulation co-ordination of highest voltages for equipments.
2)	IS-2705(I-IV)/1992	Current Transformers
3)	IS-2099	High voltage porcelain bushing.
4)	IS-3347	Dimensions of porcelain transformer bushing.
5)	IS-2071	Method of high voltage testing.
6)	IS-335	Insulation oil for transformers and switchgears.
7)	IS-2147	Degree of protection provided by enclosures for low voltages, switchgear and control.
8)	IEC-185	Current transformers.
9)	IEC-270	Partial discharge measurement.
10)	IEC-44(4)	Instrument transformer measurement of PDs.
11)	IEC-171	Insulation co-ordination.
12)	IEC-60	High voltage test techniques.
13)	IEC-8263	Method of RIV tests on high voltage insulators.
14)		Indian Electricity Rules, 1956.

ANNEXURE-II-B

POTENTIAL TRANSFORMERS

Sr.No.	Standard Reference No.	Title
1)	IS 3156 (I-III)/1992	Voltage transformers.
2)	IS-2099	High voltage porcelain bushings.
3)	IS-3347	Dimensions of porcelain transformer bushing.
4)	IS-335	Insulating oil for transformers and switchgears.
5)	IS-3202	Code of practice for climate proofing of electrical equipments.
6)	IS-2147	Degree of protection provided by enclosures for low voltage switchgears and controls.
7)	IEC-186	Voltage transformers.
8)	IEC-815	Porcelain housing for instrument Transformers.
9)		Indian Electricity Rules, 1956.

ANNEXURE-III-A

PRINCIPAL TECHNICAL PARAMETERS OF CURRENT TRANSFORMERS

(Protection cum Metering)

Sr. No.	I t e m	S P E C I F I C A T I O N
1.	Type of CT/ Installation	Single phase, Outdoor, oil filled hermetically sealed with dead tank
2.	Type of mounting	Pedestal type
3.	Suitable for system frequency	50 Hz
4.	Ratio taps	Achievable by secondary side reconnection
5.	Method of earthing system to be connected to	Solidly Effectively earthed
6.	Rated continuous thermal current (A)	120% of the rated primary current
7.	Acceptable limit of temperature rise above the specified ambient temperatures for continuous operation at rated current	As per IS 2705 (Part-I) /1992.
8.	Acceptable partial discharge level at 1.1 times the rated voltage	N.A. as per I.S. 2705 (Part-I)/1992.
9.	Max. radio interference voltage at 1.1 times the rated voltage	Less than 500 micro volts
10.	Current Ratio for Nominal system Voltage of 33KV	400-200-100/1-1-1A, (3 Core) **400-200-100/1-1A, (2 Core)**
11.	Rated Voltage / HSV (kV rms)	33kV / 36 kV
12.	Lightning Impulse Withstand Voltage(kVp)	170
13.	One minute dry /wet power frequency withstand voltage primary (kV rms)	70
14.	Rated short time withstand current for 1 second Duration (kA rms)	26.2
15.	Rated dynamic withstand current (kAp)	65.5
16.	Visual corona extinction voltage (kV rms)	-
17.	Minimum creepage distance of porcelain housing (mm)	900
18.	Primary Terminals requirement	1xϕ30x80mm
19.	Mounting Frame size requirement (mm) mounting holes	450x450mm , ϕ30mm
20.	Power frequency over voltage withstand requirement for Secondary winding (kVrms)	As per clause 9.4 and 9.5 of IS 2705(Part-I)
21.	Type of oil compensation provided.	Nitrogen cushion or SS Bellow

22 A.	Core details (3 core)				
		Core No.	I	II	III
	1	Purpose	P	P	M
	2	Burden (VA)	--	--	20
	3	Class of Accuracy	PS	PS	0.2
	4	Minimum Knee Point Voltage at lowest ratio.(Volt)	15x(Rct+19)	15x(Rct+19)	--
	5	Maximum magnetizing current at guarantee knee point voltage (mA)	100	100	--
22 B	**Core details (2core)**				
		Core No	I	II	
	1	Purpose	P	M	
	2	Burden (VA)	--	20	
	3	Class of Accuracy	PS	0.2	
	4	Minimum Knee Point Voltage at lowest ratio.(Volt)	15x(Rct+19)	--	
	5	Maximum magnetizing current at guarantee knee point voltage (mA)	100	--	
23.	The die-electric withstand values of external and internal insulation		70kV / 170kVp		
24.	Suitable test tap for measurement of capacitance, tan –delta.		Not to be provided.		

Important Note: - (i) PS: As per IS 2705 part-4 (for protection).
(ii) Rct: Resistance of secondary winding of CT
(iii) P – Protection (Main / back up)
(iv) M – Metering.
(v) Current security factor $\leq$ 5

3 core CTs will be provided for 10 MVA Power Transformers having differential protection and
2 core CTs will be provided for 33KV Feeder, incomer & 5MVA Power Transformers where differential protection is not provided.

ANNEXURE-III-B
PRINCIPAL TECHNICAL PARAMETERS OF POTENTIAL TRANSFORMERS FOR METERING PURPOSE

Sr.No.	Item	Specification	
1)	Type	Single phase/Outdoor type of oil filled and hermetically sealed.	
2)	Type of mounting	Pedestal type	
3)	Ratio taps(wherever applicable)	Not Applicable.	
4)	Rated voltage factor	1.2 continuous & 1.5 for 30 seconds.	
5)	Core details and purpose	Core I for metering	
6)	Class of accuracy	Core I : Class 0.2	
7)	Voltage ratio	Nominal System voltage 33KV	Voltage ratio $\frac{33KV}{\sqrt{3}} / \frac{110V}{\sqrt{3}}$,
8)	Highest system voltage (kV rms.)	36	
9)	Basic insulation level(kVp)	170	
10)	One minute power frequency withstand voltage dry / wet (kV rms.)	70	
11)	Minimum creepage distance (mm).	900	
12)	Primary Terminal (mm)	Ø 30 x 80	
13)	Mounting Frame size (mm) and Holes	450x450 Ø 30	
14)	Burden (VA)	Core I – 50	
15	Acceptable limits of temperature rise.	As per Annexure-IV	
16	Type of oil compensation provided	Nitrogen cushion or SS bellow	

ANNEXURE-IV
LIMITS OF TEMPERATURE RISE

The temperature rise on any part of equipment shall not exceed the maximum Temperature rise specified below under the conditions specified in Test clauses.

Sr. No.	Item	Specification	
	Nature of the part of the liquid	Maximum values of	
		Temperature Deg.C	Temp. rise at a max. ambient air Temp. not exceeding 50ºC in Deg.C
1)	Contacts in air: Silver-faced copper, copper alloy or aluminium alloy (See Notes i and ii)	105	55
	Bare copper or tinned aluminium	75	25
2)	Contacts in oil:		
	1. Silver-faced copper, copper alloy or aluminium alloy (See Note ii)	90	40
	2. Rare copper or tinned aluminium alloy	80	30
3)	Terminals to be connected to external conductors by screws or bolts silver-faced (See Note iii)	105	55
	Bare	90	40
4)	Metal parts acting as springs	See Note iv)	(See Note iv)
5)	Metal parts in contact with insulation of the following classes:		
	Class Y : (For non-impregnated materials)	90	40
	Class A: (For materials immersed in oil or impregnated)	100	50
	Class E: in air	100	50
	Class E: in oil	120	70
	Class B: in air	130	80
	Class B: In oil	100	50
	Class F: in air	155	105
	Class F: In oil	100	50
	Enamel: oil base	100	50
	Enamel: Synthetic in air	120	70
	Enamel: Synthetic in oil	100	50
6)	Any part of metal or of insulating material in contact with oil, except contacts.	100	50
7)	Oil.	90	40

NOTES:

i) When applying the temperature rise of 55 deg.C, care should be taken to ensure that no damage is caused to the surrounding insulating materials.

ii) The quality of the silver facing shall be such that a layer of silver remains at the points of contact after the mechanical endurance test. Otherwise, the contacts shall be regarded as "bare".

iii) The values of temperature and temperature rise are valid whether or not the conductor connected to the terminals is silver-faced.

iv) The temperature shall not reach a value where the elasticity of the materials is impaired. For pure copper, this implies a temperature limit of 75 deg.C.

ANNEXURE-V

LIST OF DRAWINGS

Sr. No.	Drawing No.	Details
1)	252.137.01 (R-1)	Sketch for General arrangement of Current Transformer for 36 KV.
2)	252.136.01/1 (R-0)	Combined Rating and diagram plate for current Transformer for 36 KV (3 Core)
3)	252.136.01/2 (R-0)	Combined Rating and diagram plate for current Transformer for 36 KV (2 Core)
4)	252.147.01	Sketch for General Arrangement of Potential Transformer.
5)	252.146.01(R-1)	Combined Rating and diagram plate for Potential Transformer.

GUARANTEED TECHNICAL PARTICULARS FOR 36 KV CURRENT TRANSFORMERS

Sr. No.	Particulars of GTP Parameter	Type
1)	Manufacturers name & Type (As per Annexure-I at Sr.No.1)	(TEXT)
2)	Manufacturer's type Designation.	(TEXT)
3)	Whether Conforming to standards as per clause no. 3 of the specification.	(TEXT)
4)	Rated Voltage in kV as per Annexure-I at Sr.No.11	(TEXT)
5)	Rated primary current (Amps) as per Annexure-I at Sr.No.10	(TEXT)
6)	Rated Secondary current (Amp) as per Annexure-I at Sr.No.10	(TEXT)
7)	Whether conforming to Details of Cores as per Annexure-I at Sr.No.22 A & 22 B	(TEXT)
8)	Secondary resistance corrected to 75ºC (in Ohm)	(TEXT)
9)	Magnetizing current (in mA) as per Annexure I at Sr.No.22A 5 & 22 B 5. CORE-I CORE-II CORE-III	 (TEXT) (TEXT) (TEXT)
10)	Rated dynamic withstand current (kAp) as per Annexure- I at Sr.No.15.	(TEXT)
11)	Rated short time withstands current for 1 sec. duration (26.2 kA rms) as per Annexure –I at Sr. No.14.	(TEXT)
12)	One minute dry power frequency withstand voltage (kv rms) of primary winding as per Annexure-I at Sr.No.13.	(NUMERIC)
13)	One minute wet power frequency withstand voltage (kV rms) of primary winding as per Annexure-I at Sr.No.13.	(NUMERIC)
14)	1.2/50 micro-second impulse withstand voltage (kVP) as per Annexure-I at Sr.No.12	(NUMERIC)
15)	The die-electric withstand values(kVp) of external and internal insulation as per Annexure-I at Sr.No.23	(TEXT)
16)	One minute power frequency withstands voltage of secondary winding (kV rms) as per Annexure-I at Sr.No.20.	(NUMERIC)
17)	Minimum creepage distance in mm as per Annexure- I at Sr. No. 17.	(NUMERIC)
18)	Weight of oil (kg).	(TEXT)
19)	Total Weight (kg).	(TEXT)
20)	Mounting details as per Annexure-I at Sr.No.19.	(TEXT)
21)	Overall dimension.	(TEXT)

22)	Magnetization curves as per Clause No.11.2 (b) of technical specification.	(FILE)
23)	Type of winding specified as per Clause No.5.10 &5.11 of technical specification.	(TEXT)
24)	Cross section area of primary winding	(TEXT)
25)	Cross section area of secondary winding	(TEXT)
26)	No. of Primary turns as per Clause No. 5.10.3 of technical specification.	(TEXT)
27)	No. of secondary turns as per Clause No. 5.10.3 of technical specification.	(TEXT)
28)	Current density of primary winding as per clause No.5.10.1 of technical specification (max -A/sq.mm).	(TEXT)
29)	Primary terminal as per clause No. 5.12.1 of technical specification.	(TEXT)
30)	Type of insulation & Temperature rise limits applicable as per Annexure- II	(TEXT)
31)	Whether Current transformer conforms to the Temperature rise limits mentioned above at sr. no. 30	(BOOLEAN)
32)	Whether Type test reports (within five years) as per clause No. 6.1.1 of technical specification are submitted along with the offer?	(BOOLEAN)
33)	Type of oil compensation as per Annexure-I at Sr.No.21.	(TEXT)
34)	Whether Experience sheet as per Clause No.8.1 of technical specification is submitted along with the offer?	(BOOLEAN)
35)	Whether Two year continuous servicing performance certificate as per Clause No.8.1 of technical specification is submitted along with the offer?	(BOOLEAN)
36)	Whether Turn over sheet as per clause N0.8.4 &8.5 of technical specification is submitted along with the offer?	(BOOLEAN)
37)	Whether Drawings as per clause No.11.1 & 11.2 of technical specification are submitted along with the offer?	(BOOLEAN)
38)	Whether Test tap is provided?	(BOOLEAN)
39)	Type of Pressure release device provided?	(TEXT)
40)	Partial discharge level as per Annexure- I at Sr. No. 8	(TEXT)
41)	Rated continuous thermal current as per Annexure-I at Sr. No. 6 (120% of the rated Primary current)	(TEXT)
42)	Current security factor as per Annexure- I at “Important Note “. (ISF ≤ 5)	(TEXT)
43)	Type of insulation material used	(TEXT)

GUARANTEED TECHNICAL PARTICULARS FOR POTENTIAL TRANSFORMERS

FOR 36 kV POTENTIAL TRANSFORMERS		
Sr. No.	**Particulars of GTP Parameter**	**Type**
1)	Manufacturers name & Type of PT – (Annexure-I at Sr.No.1)	(TEXT)
2)	Manufacturer's type Designation.	(TEXT)
3)	Whether Conforming to standards (Cl. No. 3.0)	(TEXT)
4)	Rated Primary Voltage in kV (Annexure-I at Sr. No 7.)	(NUMERIC)
5)	Number of secondary windings (Annexure-I at Sr. No 7.)	(NUMERIC)
6)	Rated secondary voltage (Volts) (Annexure-I at Sr. No. 7)	(NUMERIC)
7)	Rated burden (VA) (Annexure-I at Sr. No 14.)	(NUMERIC)
8)	Accuracy class (Annexure-I at Sr. No. 6.)	(TEXT)
9)	Highest system voltage (kV) (Annexure-I at Sr. No. 8)	(NUMERIC)
10)	Quantity of oil (Liters)	(TEXT)
11)	Type of insulation & Temperature rise limits applicable as per Annexure- II	(TEXT)
12)	Whether Potential transformer conforms to the Temperature rise limits mentioned above at sr. no. 11	(BOOLEAN)
13)	Rated voltage factor & time (Annexure -I at Sr. No. 4)	(TEXT)
14)	One minute power frequency withstand voltage test (dry) (kV rms) (Annexure -I at Sr.No.10)	(NUMERIC)
15)	One minute power frequency withstand voltage test (wet) (kV rms) (Annexure – I at Sr. No.10)	(NUMERIC)
16)	1.2/50 microsecond impulse wave withstand test voltage (kVP) (Annexure – I at Sr. No. 9.)	(NUMERIC)
17)	One minute power frequency withstand voltage on secondary (kV rms) (Cl. 9.4 of IS-3156(part-1)/1992.)	(NUMERIC)
18)	Minimum Creepage distance (mm) (Annexure-I at Sr No. 11.)	(NUMERIC)
19)	Weight of oil (kg)	(TEXT)
20)	Total weight (kg)	(TEXT)
21)	Overall dimensions	(TEXT)
22)	Mounting details (Annexure – I at Sr. No. 13.)	(TEXT)
23)	Primary terminals (Clause 5.12 of technical specification.)	(TEXT)
24)	Whether Type test reports (within 5 years) as per clause 6.1.1 of technical specification are submitted along with the offer?	(TEXT)

25)	Type of oil compensation (Annexure-I at Sr.No.16.)	(TEXT)
26)	Whether experience sheet as per Clause No.8.1 of technical specification is submitted along with the offer?	(TEXT)
27)	Whether two year continuous servicing performance certificate as per Clause No.8.1 of technical specification is submitted along with the offer?	(TEXT)
28)	Whether Turn over sheet as per clause No.8.4 & 8.5 of technical specification is submitted along with the offer?	(TEXT)
29)	Whether Drawings as per clause No.11.1 & 11.2 of technical specification are submitted along with the offer?	(TEXT)
30)	Whether Pressure release device as per clause No.11.2j of technical specification is provided?	(TEXT)
31)	Type of insulation material used for PT	(TEXT)
32)	Actual Clearance between live part and ground (mm)	(TEXT)

SCHEDULE-C

SCHEDULE OF TENDERER'S EXPERIENCE

Tenderer 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 of order	Value of order	Period of supply and commissioning	Names & Addresses to whom reference may be made

Name of the firm_____

Signature of the tenderer_____

Designation_____

Date_____

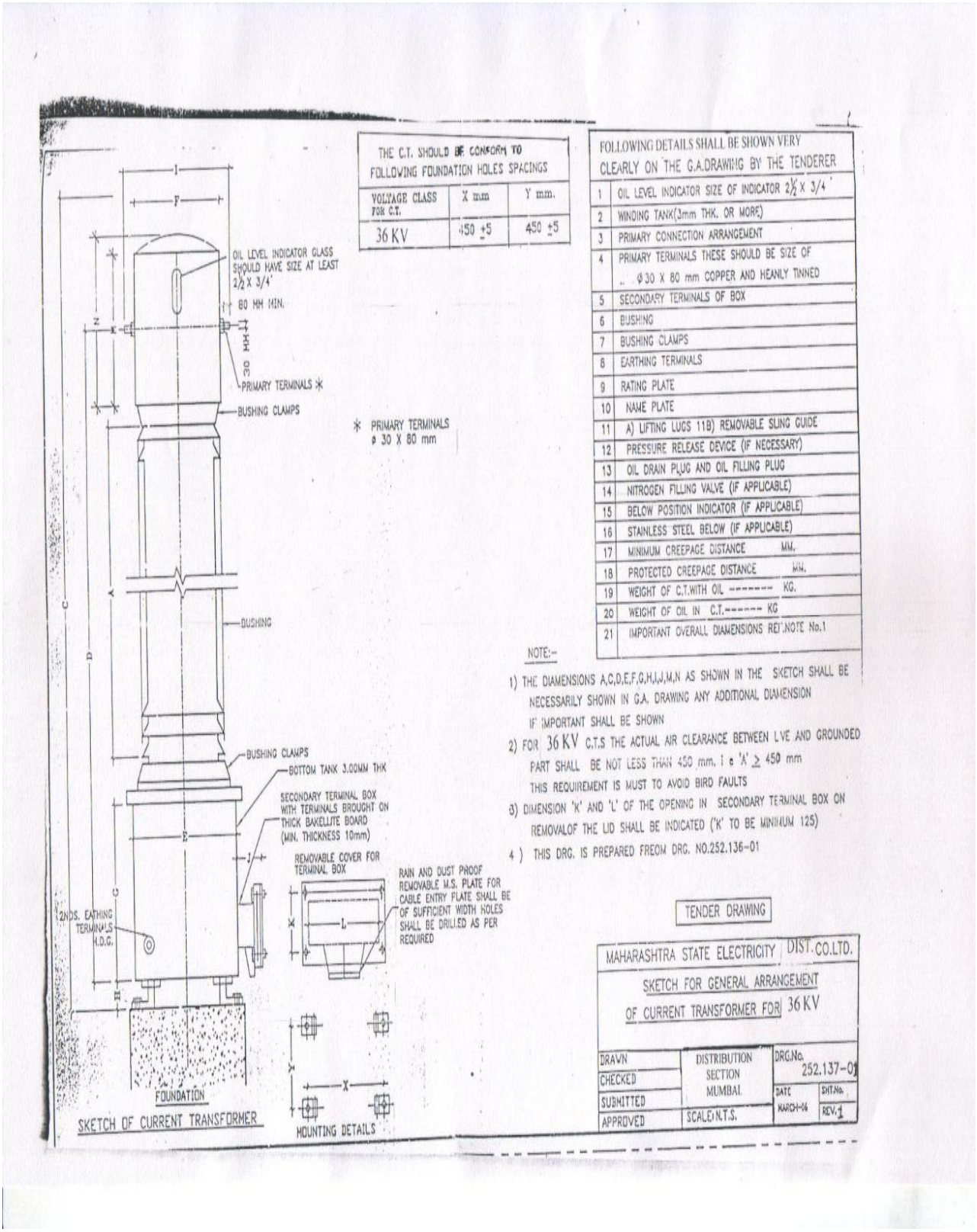
SCHEDULE – 'F'

PROFORMA OF UNDERTAKING

We hereby confirm that Current Transformers offered by us against this tender are of the same design and type as have been supplied to M.S.E.B./M.S.E.D.C.L. against earlier order No._____ dtd. _____and all the Type Test Reports thereof were approved by C.E. (Dist.) 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 TENDERER



THE C.T. SHOULD BE CONFORM TO FOLLOWING FOUNDATION HOLES SPACINGS		
VOLTAGE CLASS FOR C.T.	X mm	Y mm.
36 KV	450 ±5	450 ±5

FOLLOWING DETAILS SHALL BE SHOWN VERY CLEARLY ON THE G.A.DRAWING BY THE TENDERER	
1	OIL LEVEL INDICATOR SIZE OF INDICATOR 2½ X 3/4'
2	WINDING TANK(3mm THK. OR MORE)
3	PRIMARY CONNECTION ARRANGEMENT
4	PRIMARY TERMINALS THESE SHOULD BE SIZE OF .. ø 30 X 80 mm COPPER AND HEANLY TINNED
5	SECONDARY TERMINALS OF BOX
6	BUSHING
7	BUSHING CLAMPS
8	EARTHING TERMINALS
9	RATING PLATE
10	NAME PLATE
11	A) LIFTING LUGS 11B) REMOVABLE SLING GUIDE
12	PRESSURE RELEASE DEVICE (IF NECESSARY)
13	OIL DRAIN PLUG AND OIL FILLING PLUG
14	NITROGEN FILLING VALVE (IF APPLICABLE)
15	BELOW POSITION INDICATOR (IF APPLICABLE)
16	STAINLESS STEEL BELOW (IF APPLICABLE)
17	MINIMUM CREEPAGE DISTANCE MM.
18	PROTECTED CREEPAGE DISTANCE MM.
19	WEIGHT OF C.T.WITH OIL ------- KG.
20	WEIGHT OF OIL IN C.T.------ KG
21	IMPORTANT OVERALL DIAMENSIONS REF.NOTE No.1

NOTE:-

1) THE DIAMENSIONS A,C,D,E,F,G,H,J,M,N AS SHOWN IN THE SKETCH SHALL BE NECESSARILY SHOWN IN G.A. DRAWING ANY ADDITIONAL DIAMENSION IF IMPORTANT SHALL BE SHOWN
2) FOR 36 KV C.T.S THE ACTUAL AIR CLEARANCE BETWEEN L.V.E AND GROUNDED PART SHALL BE NOT LESS THAN 450 mm. i e 'A' ≥ 450 mm THIS REQUIREMENT IS MUST TO AVOID BIRD FAULTS
3) DIMENSION 'K' AND 'L' OF THE OPENING IN SECONDARY TERMINAL BOX ON REMOVALOF THE LID SHALL BE INDICATED ('K' TO BE MINIMUM 125)
4) THIS DRG. IS PREPARED FREOM DRG. NO.252.136-01

TENDER DRAWING

MAHARASHTRA STATE ELECTRICITY DIST.CO.LTD.
SKETCH FOR GENERAL ARRANGEMENT OF CURRENT TRANSFORMER FOR 36 KV

DRAWN	DISTRIBUTION SECTION MUMBAI	DRG.No.	252.137-01
CHECKED		DATE	SHT.No.
SUBMITTED		MARCH-06	REV.1
APPROVED	SCALE:N.T.S.		

CURRENT TRANSFORMER

STANDARD		RATED CT RATIO (AMPS)	
HIGHEST SYSTEM VOLTAGE (KV)		SHORT TIME CURRENT (KA/SEC)	
NOMINAL SYSTEM VOLTAGE (KV)		RATED DYNAMIC CURRENT (KA)	
INSULATION LEVEL (KV)		WT. OF OIL (KG)	
FREQUENCY (HZ)		OIL IN LTR.	
DRAWING NO.		TOTAL WT. (KG)	
MIN. TOTAL CREEPAGE (mm)		SERIAL NO.	
		RATED THERMAL CURRENT (120 % OF RATED PRY. CURRENT)	

SUITABLE FOR HOT LINE WASHING

CAUTION: SECONDARY TERMINALS MUST BE SHORT CIRCUITED BEFORE THE BURDEN IS DISCONNECTED.

——— DIAGRAM FOR CONNECTION OF PRIMARY AND SECONDARY TERMINALS ———

CORE	TERMINALS	RATIO AMPS.	RATING CLASS OF		K. P. V. / EX. AMPS.	SECONDARY RESISTANCE AT 75 ° C (RCT)
			VA	ACCURACY		
I	1S1-1S2					
	1S1-1S3					
	1S1-1S4					
II	2S1-2S2					
	2S1-2S3					
	2S1-2S4					
III	3S1-3S2					
	3S1-3S3					
	3S1-3S4					

——— DETAILS OF SECONDARY CONNECTIONS FOR RATIO SELECTION ———

CLINT :- MAHARASHTRA STATE ELECTRICITY DISTRIBUTION CO. LTD.

NAME OF THE MANUFACTURER: PLACE:
ORDER REFERENCE: DT.OF MFG.:

NOTE:-

1) CAUTION TO BE IN RED LETTERS.
2) MIN.THICKNESS OF RATING CUM DIAGRAM AL. PLATE = 1.5 MM
3) CLIENT NAME i.e. MAHARASHTRA STATE ELECTRICITY DIST. CO. LTD. TO BE IN 1/2 " SIZE LETTER.
4) DIMENSIONS OF NAME PLATE SHALL BE 210 X 300 MM.

MAHARASHTRA STATE ELECTRICITY DISTIBUTION CO. LTD.				
RATING AND DIAGRAM PLATE FOR 36 KV CT (3 CORE)				
DRAWN		DISTRIBUTION SECTION, HEAD OFFICE, MUMBAI.		DRG. NO.: 252.136.01 / 1
CHECKED				REV.: 0
SUBMITTED				
APPROVED		SCALE :	N.T.S.	DATE:

CURRENT TRANSFORMER

STANDARD		RATED CT RATIO (AMPS)	
HIGHEST SYSTEM VOLTAGE (KV)		SHORT TIME CURRENT (KA/SEC)	
NOMINAL SYSTEM VOLTAGE (KV)		RATED DYNAMIC CURRENT (KA)	
INSULATION LEVEL (KV)		WT. OF OIL (KG)	
FREQUENCY (HZ)		OIL IN LTR.	
DRAWING NO.		TOTAL WT. (KG)	
MIN. TOTAL CREEPAGE (mm)		SERIAL NO.	
		RATED THERMAL CURRENT (120 % OF RATED PRY. CURRENT)	

SUITABLE FOR HOT LINE WASHING

CAUTION: SECONDARY TERMINALS MUST BE SHORT CIRCUITED BEFORE THE BURDEN IS DISCONNECTED.

DIAGRAM FOR CONNECTION OF PRIMARY AND SECONDARY TERMINALS

CORE	TERMINALS	RATIO AMPS.	RATING CLASS OF		K. P. V. / EX. AMPS.	SECONDARY RESISTANCE AT 75 ° C (RCT)
			VA	ACCURACY		
I	1S1-1S2					
	1S1-1S3					
	1S1-1S4					
II	2S1-2S2					
	2S1-2S3					
	2S1-2S4					

DETAILS OF SECONDARY CONNECTIONS FOR RATIO SELECTION

CLINT :- MAHARASHTRA STATE ELECTRICITY DISTRIBUTION CO. LTD.

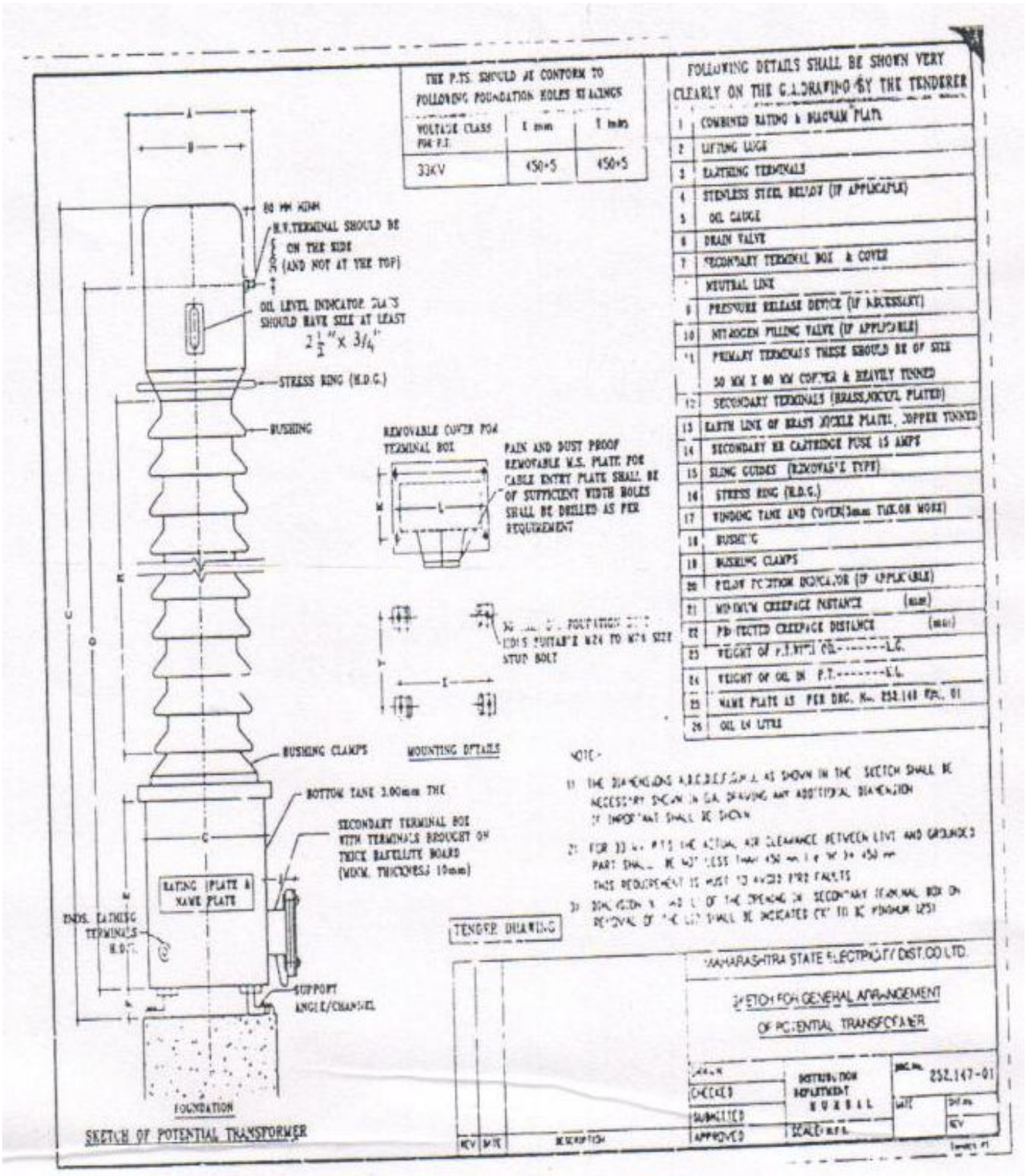
NAME OF THE MANUFACTURER:
ORDER REFERENCE:

PLACE:
DT.OF MFG.:

NOTE:-

1) CAUTION TO BE IN RED LETTERS.
2) MIN.THICKNESS OF RATING CUM DIAGRAM AL. PLATE = 1.5 MM
3) CLIENT NAME i.e. MAHARASHTRA STATE ELECTRICITY DIST. CO. LTD. TO BE IN 1/2 " SIZE LETTER.
4) DIMENSIONS OF NAME PLATE SHALL BE 210 X 300 MM.

MAHARASHTRA STATE ELECTRICITY DISTIBUTION CO. LTD.				
RATING AND DIAGRAM PLATE FOR 36 KV CT (2 CORE)				
DRAWN		DISTRIBUTION SECTION, HEAD OFFICE, MUMBAI.		DRG. NO.: 252.136.01 / 2.
CHECKED				REV.: 0
SUBMITTED				
APPROVED		SCALE :	N.T.S.	DATE:


THE P.TS. SHOULD BE CONFORM TO FOLLOWING FOUNDATION HOLES FIXINGS
VOLTAGE CLASS FOR P.T.
33KV
450+5
450+5
FOLLOWING DETAILS SHALL BE SHOWN VERY CLEARLY ON THE G.A.DRAWING BY THE TENDERER
1 COMBINED RATING & DIAGRAM PLATE
2 LIFTING LUGS
3 EARTHING TERMINALS
4 STAINLESS STEEL BELLOW (IF APPLICABLE)
5 OIL GAUGE
6 DRAIN VALVE
7 SECONDARY TERMINAL BOX & COVER
NEUTRAL LINK
8 PRESSURE RELEASE DEVICE (IF NECESSARY)
10 NITROGEN FILLING VALVE (IF APPLICABLE)
11 PRIMARY TERMINALS THESE SHOULD BE OF SIZE 50 MM X 80 MM COPPER & HEAVILY TINNED
12 SECONDARY TERMINALS (BRASS,NICKEL PLATED)
13 EARTH LINK OF BRASS NICKLE PLATED, COPPER TINNED
14 SECONDARY HR CARTRIDGE FUSE 15 AMPS
15 SLING GUIDES (REMOVABLE TYPE)
16 STRESS RING (H.D.G.)
17 WINDING TANK AND COVER(3mm THICK OR MORE)
18 BUSHING
19 BUSHING CLAMPS
20 OIL LEVEL POSITION INDICATOR (IF APPLICABLE)
21 MINIMUM CREEPAGE DISTANCE (mm)
22 PROTECTED CREEPAGE DISTANCE (mm)
23 WEIGHT OF P.T.WITH OIL -------K.G.
24 WEIGHT OF OIL IN P.T.-------K.G.
25 NAME PLATE AS PER DRG. No. 252.148 REV. 01
26 OIL IN LITRES
80 MM MIN
H.T.TERMINAL SHOULD BE ON THE SIDE (AND NOT AT THE TOP)
OIL LEVEL INDICATOR GLASS SHOULD HAVE SIZE AT LEAST 2 1/2" X 3/4"
STRESS RING (H.D.G.)
BUSHING
REMOVABLE COVER FOR TERMINAL BOX
RAIN AND DUST PROOF REMOVABLE M.S. PLATE FOR CABLE ENTRY PLATE SHALL BE OF SUFFICIENT WIDTH HOLES SHALL BE DRILLED AS PER REQUIREMENT
STUD BOLT
BUSHING CLAMPS
MOUNTING DETAILS
BOTTOM TANK 3.00mm THK
SECONDARY TERMINAL BOX WITH TERMINALS BROUGHT ON THICK BAKELITE BOARD (MIN. THICKNESS 10mm)
RATING PLATE & NAME PLATE
ENDS. EARTHING TERMINALS H.D.G.
SUPPORT ANGLE/CHANNEL
FOUNDATION
SKETCH OF POTENTIAL TRANSFORMER
NOTE:-
1) THE DIMENSIONS A,B,C,D,E,F,G,H,I,J AS SHOWN IN THE SKETCH SHALL BE NECESSARY SHOWN IN G.A. DRAWING ANY ADDITIONAL DIMENSION IF IMPORTANT SHALL BE SHOWN
2) FOR 33 KV P.T.S THE ACTUAL AIR CLEARANCE BETWEEN LIVE AND GROUNDED PART SHALL BE NOT LESS THAN 450 mm i.e. 33 KV = 450 mm THIS REQUIREMENT IS MUST TO AVOID FIRE FAULTS
3) DIMENSION X AND Y OF THE OPENING IN SECONDARY TERMINAL BOX ON REMOVAL OF THE LID SHALL BE INDICATED ON TO BE MINIMUM 125!
TENDER DRAWING
MAHARASHTRA STATE ELECTRICITY DIST.CO LTD.
SKETCH FOR GENERAL ARRANGEMENT OF POTENTIAL TRANSFORMER
DRAWN
CHECKED
SUBMITTED
APPROVED
DISTRIBUTION DEPARTMENT
KURLA
SCALE: N.T.S.
DRG. No. 252.147-01
DATE
SHEET No.
REV
REV DATE DESCRIPTION

POTENTIAL TRANSFORMER

STANDARD	
HIGHEST SYSTEM VOLTAGE (KV)	
NOMINAL SYSTEM VOLTAGE (KV)	
INSULATION LEVEL (KV)	
FREQUENCY (HZ)	
R.V.F. / TIME	
NEUTRAL	
DRAWING NO.	
WEIGHT OF OIL (KG)	
TOTAL WEIGHT (KG)	
MIN. TOTAL CREEPAGE (mm)	

SECY. WINDING - I	PRY. VOLTS	
	VOLTS	
	V.A.	
	CLASS	
	SR. NO.	

SUITABLE FOR HOT LINE WASHING

---------- **DIAGRAM FOR CONNECTION OF PRIMARY AND SECONDARY TERMINALS** ----------

VOLTAGE RATIO	PRIMARY TERMINALS	SECONDARY TERMINALS

CAUTION : DO NOT REMOVE EARTH LINK WHEN H.V. TERMINAL IS LIVE.

CLINT :- MAHARASHTRA STATE ELECTRICITY DISTRIBUTION CO. LTD.

NAME OF THE MANUFACTURER: PLACE:
ORDER REFERENCE: DT.OF MFG.:

NOTE:-

1) CAUTION TO BE IN RED LETTERS.
2) MIN.THICKNESS OF RATING CUM DIAGRAM AL. PLATE = 1.5 MM
3) CLIENT NAME i.e. MAHARASHTRA STATE ELECTRICITY DIST. CO. LTD. TO BE IN 1/2 " SIZE LETTER.
4) ALL NEUTRAL ENDS OF EACH SECONDARY TERMINALS WINDING TO BE EARTHED THROUGH SEPARATE EARTH LINK WITH ONE COMMON EARTHING POINT. THIS ARRANGENMENT TO BE INDICATED IN THE CONNECTION DIAGRAM.
5) DIMENSIONS OF NAME PLATE SHALL BE 210 X 300 MM.

MAHARASHTRA STATE ELECTRICITY DISTIBUTION CO. LTD.				
RATING AND DIAGRAM PLATE FOR 36 KV PT				
DRAWN		DISTRIBUTION SECTION, HEAD OFFICE, MUMBAI.		DRG. NO.: 252.146.01
CHECKED				
SUBMITTED				REV.: 1
APPROVED		SCALE :	N.T.S.	DATE: