

**Technical specification of
33KV 220V DC FEEDER VCBs & CURRENT
TRANSFORMERS
(W/o C&R Panels)**

I. SCOPE :

This specification covers the manufacture, assembly, supply and delivery at Destination stores of 33 KV (Vacuum) Out Door porcelain clad pad type circuit breakers including current transformers for outdoor installations. The power system is with neutral solidly earthed. **The equipment shall be guaranteed for 5 years.**

II. APPLICABLE STANDARDS:

Unless otherwise modified in this specification, the Circuit Breakers, Current Transformers etc. shall comply with the following Standards with latest amendments.

- IS 13118/1991 – High Voltage A.C. Circuit Breakers.
- IEC 62271-100/2008 – Circuit Breakers.
- IS 2705 (Part I to IV/1992) – Current Transformers.
- IS 13947/(Pt-1993 – Degree of protection provided by Enclosures.

III. CLIMATIC CONDITIONS:

The climatic conditions under which the equipment shall operate satisfactorily are as indicated at clause No. 22 of General and Financial terms and conditions for supply of materials.

IV. PRINCIPAL PARAMETERS :**1. CIRCUIT BREAKERS :**

- 1.1. Nominal System Voltage : 33KV
- 1.2. Type : Vacuum porcelain clad
- 1.3. Service : ---- out door ---
- 1.4. No. of Poles/Phases : ---- THREE ---
- 1.5. Highest System Voltage : 36KV
- 1.6. Rated Frequency : ----- 50 Hz -----
- 1.7. System of earthing : ---- Neutral solidly grounded ----
- 1.8. Insulation level :
- 1.8.1. Lightning Impulse withstand Voltage : 170 KV peak
- 1.8.2. One minute power frequency withstand voltage : 70 KV (rms)
- 1.8.3. Power frequency withstand : --- -2 KV (rms) ---/1 minute voltage on Auxiliary circuit

Note : Please note that the above insulation levels supply at the reference conditions of temperate, pressure and humidity specified below :

- Temperature : 20 degree C.
 Pressure : 1013 millibars
 Humidity : 11 g/m³
- 1.9 Rated Thermal Current : **1600A**
- 1.10. Rated short circuit :
 breaking current
- 1.10.1. Symmetrical : 25 KA /3 Sec**
- 1.10.2. Asymmetrical : As per IS : 13118/1991 or IEC – 62271-100/2008
- 1.11. Rating making capacity : 2.50 times Rated short circuit breaking
 Current (Symmetrical)
- 1.12. Rated short time withstand
 Current for 3Sec. : 25 KA
- 1.13 Total break time : **60 m. sec (max)**
- 1.14 Bushing Insulator
 Creepage distance : Not less than 900 mm
- 1.15. Mounting :--- Steel Structure --- (GI)
- 1.16. Rated Operating sequence : --- O-0.3 Sec. – CO– 3 Min – CO.
- 1.17. Operating Mechanism : Motor operated/ Manual spring Charged. The standard
 DC Voltage for the operating devices shall be 250V DC.
 Operating Voltage for motor spring charging mechanism
 shall be 250V +/- 20 % DC/AC single phase. Normally
 the breaker shall be operated by Power and there shall be
 provision for manual operation.
- 1.18. Terminal Connector :
- 1.18.1. Material : --- Aluminium ---
- 1.18.2. Suitable for : Panther ACSR
- 1.19. Limits of temperature : The limits of temperature shall be in accordance with.
 IS : 13118/IEC 62271-100/2008.
- 1.20. Requirement of Simultaneity
 of Poles : The maximum difference between instants of contact
 touching during closing and the maximum difference
 between the instant of contacts separation during
 opening between 3 poles shall not exceed one half cycle
 of the rated frequency. The Breaker shall be open and
 close simultaneously on all three phases for fault on any
 phase and or all the phases.

- 1.22 : Auxiliary Power Supply**
- 1.22.1 A.C. Supply : 250 V + or – 20% (Phase to neutral),
50 HZ + or – 5%,
Effectively earthed system.
- 1.22.2 D.C. Supply : 250V + or – 20%, 2 wire
ungrounded system.
- 1.22.3. Supply point:
- 1.22.3.1 : Auxiliary power supplies listed above will be made
available to each circuit breaker as below :
- A.C. Supply : Single Feeder
- D.C. Supply : Single feeder
- 1.22.3.2 M.C.B. shall be provided at the circuit breaker for each
Incoming A.C. Supply. For D.C. supply double pole
M.C.B. shall be provided. (with different colours for each
identification). The rating of MCB shall be 10A.

2. CURRENT TRANSFORMERS :

- 2.1 Rated voltage : 33 KV
- 2.2. Type : --- Single phase outdoor live tank oil
Cooled Vacuum impregnated type –
- 2.3. Earthing : --- Solidly earthed ---
- 2.4 Insulation level :
- 2.4.1. Nominal system voltage : 33 KV
- 2.4.2. Highest system voltage : 36 KV
- 2.4.3. Lighting Impulse withstand voltage : 170 KV
- 2.4.4. One minute power frequency
Withstand voltage
- (a) Primary (HV) : 70 KV
- (b) Secondary (LV) : 3 KV
- 2.5. Frequency : --- 50 Hz ---
- 2.6. Transformation ratio : 400-200-100/1-1A
- 2.7 Rated secondary current (Amp) :
- i) Core I (Protection) : 1A
- ii) Core II (Metering) : 1A
- 2.8 Rated output (VA) :
- i) Protection : 15VA
- ii) Metering : 5 VA
- 2.9 Class of accuracy :
- 2.9.1.i) Protection (Core I) : 5P10
- 2.9.1.ii) Metering (Core II) : 0.2S
- 2.10 Short time thermal current : 25KA/3 Sec
And its duration : The short time thermal current should
Suit the breaker rupturing capacity and
Duration to suit the maximum tripping
Time.
- 2.11. Accuracy Limit factor : --- 10 for protective core ---

2.12. Class of Insulation	:	Immersed in new insulating oil.
2.12.1 Limit of Temp. Rise (Max)	:	55 Degree C
2.13 Rated Continuous Thermal Current:		1600 A

TECHNICAL REQUIREMENTS :

I. CIRCUIT BREAKERS

1.1 DESIGN CRITERIA

The equipment will be used in High Voltage system having characteristics as listed in the specification.

The equipment will be installed outdoor in hot, humid and tropical atmosphere.

All equipment, accessories and wiring shall have tropical protection, involving special treatment of metal and insulation against fungus, insects and corrosion.

The maximum temperature in any part of the equipment at specified rating shall not exceed the permissible limits as stipulated in the relevant standards.

The equipment shall be capable of withstanding the dynamic and thermal stresses of listed short circuit current without any damage or deterioration.

The safety clearances of all live parts of the equipment shall be as per relevant standards.

The breaker shall be of M2 class (10,000 operations)

1.2 TYPE AND DUTY :

The circuit breaker shall be outdoor, 3-pole, vacuum type having internal isolation without any sequential interlock.

In the event of order, the tenderer have to offer at least one breaker tested in respect of Temperature rise test and Mechanical endurance test of 10,000 Mechanical operations (M2 Class) in presence of purchaser representative as an acceptance test.

The duty of the circuit breaker shall involve satisfactory interruption of short circuit currents as listed in the clause-IV (Principal Parameters).

The breaker shall be capable of interruption of reactive current (lagging/leading) without under/over voltage.

1.3 CONSTRUCTION FEATURES :

1.3.1 GENERAL ARRANGEMENTS :

The circuit breaker shall have fixed type construction consisting three single identical poles, complete with a gang operated mechanism for specified duty. The interrupters shall be enclosed in a sealed porcelain housing conforming to protection to IS:13947 (PT-1) equivalent to IP-65 protection (IS:2147). All three poles of circuit breaker shall be linked together electrically / mechanically to ensure simultaneous closing/tripping of all poles.

The trip free operating mechanism, 3 phase inter connection links shall be completely accommodated in the base. There shall be sufficient clearance between live parts of the circuit breakers and the ground. The circuit breaker shall be complete with operating

mechanism, other accessories/materials to ensure complete assembly and proper functioning. The current transformers shall be externally mounted on the supporting structure integrated with circuit Breaker structure. Terminal connectors suitable for Panther ACSR conductor for 33 KV should be supplied for Circuit Breakers and CTs. The circuit breaker shall be provided with proper standard earthing and with terminal earth bar for earthing connection. Suitable inter-connection XLPE Cables from Circuit Breaker terminals and Current Transformer Terminals are to be provided.

Neither the circuit breaker nor any part of the switchgear or its supporting structures shall be permanently strained due to vibration etc. when making or breaking the rated short circuit currents.

The details of any device incorporated in the circuit breakers to limit or control the rate of restriking voltage across the circuit breaking contacts shall be stated.

The vacuum interrupter assembly used in the circuit breakers shall be interchangeable with indigenously available vacuum interrupters (make and type shall be mentioned.).

All metal enclosures shall be fabricated from minimum 2.5mm CRCA steel sheet free from all surface defects. The panel shall have sufficient structural re-enforcement to ensure a plain surface to limit vibration and to provide rigidity during dispatch and installation

1.3.2 MAIN CONTACTS AND ARC QUENCHING CHAMBER :

The main contacts shall have adequate area and contact pressure for carrying rated continuous and short time current without excessive heating liable to cause pitting and h

The tips of the arcing and main contacts shall be **special copper-Chromium alloy**.

The contacts that are adjustable to allow for wear, shall be easily replaceable and shall have minimum movable part and adjustments. The arc-quenching device shall be of robust construction and shall not require any critical adjustment. The devices shall be easily accessible and removable for access to the breaker contacts.

Flexible laminations shall be of electrolytic copper. The ends of the laminations shall be solidified with hot pressed /electro fusion/Electro solidification method to ensure good electrical contacts and achieve minimum contact resistance.

INTERLOCK :

All electrical and mechanical interlocks which are necessary for safe and satisfactory operation of the circuit breaker shall be furnished.

1.3.3. AUXILIARY CONTACTS :

Each breaker shall be provided with **6 normally open** and **6 normally** closed electrically separate spare Auxiliary contacts in addition to those required for its own operation and indication exclusively for purchaser's use.

The auxiliary contacts shall be rated for 10A for AC and 10A for DC.

Note : 1. 1no Spare tripping coil and 1no closing coil shall be clamped in the Breaker.

2. Spring charging multiplier with 2 NO+2NC shall be available and shall be wired to the spare terminal blocks.

1.3.4. INSULATORS :

Bushing insulators for circuit Breakers shall comply with IS2099-1986 specification for High Voltage porcelain bushings.

Insulators shall be wet process porcelain, brown glazed and free from all blemishes. Ferrous metal parts and hardware shall be hot-dip galvanised.

Insulators shall have adequate mechanical strength and rigidity to withstand the duty involved.

When operated at maximum system voltage, there shall be no electrical discharge. Shielding rings, if necessary, shall be provided. Insulation shall be coordinated with basic impulse level of the system. The creepage distance shall correspond to heavily polluted atmosphere.

1.4. OPERATING MECHANISM:

The operating mechanism shall be motor operated and manual operated for spring closing mechanism with trip free features complete with shut trip coils. All three poles of the breaker shall operate simultaneously. It shall operate in principle in such a way that the closing springs after each closing operation, are automatically charged by the motor and locked in the charged position by a latch. Means shall be provided to charge the springs manually also. Provision shall be made for the slow closing of the VCB irrespective of spring charge position.

The contact loading spring shall be designed in such a way that the closing stroke be completed and the opening stroke is commenced only from fully closed position. All the breakers shall be suitable for manual operation as well as slow closing irrespective of spring charge position.

Operation counter and mechanically operated indicator to show whether the circuit breaker is open or closed shall be provided on the circuit breaker operating mechanism.

All manually operating gear shall be so designed that the circuit breaker can be operated by one movement. The mechanism shall be such that the tripping spring can be charged while the circuit breaker is closed and the closing mechanism when charged shall not be operated by vibration caused by the circuit breaker opening under fault conditions.

The mechanism shall be designed for electrical control from remote. Local manual close/trip (lever/button) shall be provided in the mechanism box only.

No mechanical /electrical inter lock shall be inbuilt the manual spring charging of breaker.

Mechanical components other than spring charging mechanism link linkages shaft etc. shall have minimum plating thickness of 10-15 microns. The surface finishing ensures zinc plating trivalent passivation (ROHS compliance) and should withstand for salt spray test in artificial atmosphere upto 192 hours without white rust.

All fasteners exposed to Air should be of hot dip galvanized of MS 8.8 Grade for M10 and above and below M10 grade shall be of stainless steel.

The maximum power required for closing coil and shunt trip coil should not be more than 200 watts.

1.5 CONTROL CUBICLE (MECHANISM BOX)

A common control cubicle shall be furnished to house electricals, controls, monitoring devices and all other accessories except those which must be located on individual poles.

The cubicle shall have protection as per IS-13947 PT-1 equivalent to IP-55 protection (IS-2147) of gasketed weather proof construction, fabricated from sheet steel minimum 2.5mm thick.

The cubicle shall have front access door with lock and keys, and removable gland plate at the bottom for cable entry.

Additional locking arrangement (pad locking facility) is to be provided

1.6 WIRING & TERMINAL BLOCKS :

1.6.1 WIRING

Wiring shall be complete in all respects to ensure proper functioning of the control, protection, monitoring and interlocking schemes.

Wiring shall be done with flexible **1100 V** grade, PVC insulated switch board wires with 2.5 sq.mm. stranded copper conductor.

CT wiring.. TB must be connected / disconnected type of ledger type 12 way and control wiring terminal ledger must be 16A open type

All CT wiring must be done with 2.5mm/ 4 mm dia ring type lugs only

Wiring between individual poles and control cubicle shall be routed through G.I. Conduits.

Each wire shall be identified at both ends with permanent markers bearing wire numbers as per wiring diagram. The wiring schematic may conform to relevant standards.

Wire termination shall be done with crimping type connectors with insulating sleeves. Wire shall not be spliced between terminals.

All spare contacts of relays, push buttons, auxiliary switchers etc. shall be wired upto terminal blocks in the control cubicle.

1.6.2. TERMINAL BLOCKS :

Terminal blocks shall be 1100 V grade, box clamp type (Nut & Bolt Type).

Not more than two wires shall be connected to any terminal. Spare terminals equal in number to 20% active terminals shall be furnished.

Terminal blocks shall be located to allow easy access. Wiring shall be so arranged that individual wires of an external cable can be connected to constructive terminals.

For CTPT – disconnected type terminal blocks are required.

1.7 NAME/RATING PLATE:

BREAKERS : Each circuit-breaker shall be provided with a name plate or plates legibly and indelibly marked with atleast the following information:

- a) Name of manufacturer.
- b) Type of designation and serial number.
- c) Rated Voltage and current.
- d) Rated frequency.
- e) Rated symmetrical breaking capacity.
- f) Rated making capacity and
- g) Rated short-time current and its duration.
- h) P.O.No. with Date
- i) Period of guarantee

- Note :
1. The word “Rated” need not appear on the name plate, recognised abbreviations may be used to express the above quantities.
 2. When the circuit breaker is fitted with closing and/or tripping devices necessitating any auxiliary supply the nature of the auxiliary supply shall be stated either on the circuit breaker name-plate or in any other acceptable position.
 3. The purchase order No. and date and year of supply and the words AP-PDCL must be etched on the name plate.

1.8 PAINTING:

Before painting all non-galvanised parts shall be completely cleaned and made free of rust, scale and grease and all external rough surface cavities on casting shall be filled by metal deposition. It shall be ensured that Phosphate coating is done by a suitable process on both the external and internal surfaces. The painting to be done on surface shall be by powder coating process

The interior parts and internal structural steel work shall be cleaned of all scale and rust by sand blasting or other approved method.

All external surface shall receive a minimum of 3 coats of paint All metal enclosures shall be treated in 7 tank Pre-treatment process & should be painted with UV Resistant Pure Polyester Powder coating. The powder coated sheet steel fabrication shall fulfill 700Hrs of Salt spray test. The thickness of Painting/Powder coating shall be of 70-90 microns to withstand tropical heat and extremes of weather. The paint shall be guaranteed for 5 years from the date of receipt of material.

II CURRENT TRANSFORMERS :

1.1 CONSTRUCTION

The core shall be high grade non-ageing electrical silicon-laminated steel of low hysteresis loss and high permeability to ensure high accuracy, at both normal and over current.

The secondary terminals shall be brought into a compartment on one side of current transformer for easy access. The Secondary terminal shall be provided with short circuiting arrangements. The secondary taps shall be adequately reinforced to withstand normal handling, without damage.

The current transformers shall be suitable for mounting on steel structures or concrete pedestals. The necessary flanges, bolts, etc, for the base of the Current Transformer shall be supplied and these shall be galvanised. The current transformer tank and other metal parts shall be galvanised.

The primary of the current transformers shall have double cotton covered roped conductors with insulation by kraft paper. The secondary shall be super enameled copper wire. Details of winding and core including sectional drawings shall be furnished.

The Current Transformers shall be complete in all respects with filling of oil conforming to IS:335 and with oil level indicator with minimum/maximum oil levels.

1.2. PRIMARY & SECONDARY TERMINALS: Primary terminals of Current Transformers to which the line connections are to be made shall have dimensions as per IS: 10601:1983 and **material shall be of tinned cooper.**

The secondary terminals shall be brought out into suitable compartment, which shall have a removable cover. The terminal box with the cover closed and tightened and the cable/conduit in position when supplied shall have a degree of protection conforming to IP 54 of IS: 2147. **The secondary terminals will be M6 Tinned Brass studs.**

1.3. TERMINAL AND EARTH CONNECTORS: Terminal connectors suitable for Panther ACSR Conductor shall be supplied. Suitable earth connectors for earthing connections shall also be supplied.

Thickness of the clamp must be minimum of 12mm and the stud clamp will be bimetallic.

1.4. EARTHING: The assembly comprising of the chasis, frame work and the fixed parts of the metal casing of the CT, shall be provided with two separate earthing terminals. The earthing terminals shall be adequate size protected against corrosion and metallicly clean and identified by means of the sign marked in a legible and indelible manner on or adjacent to the terminals.

1.5. SEALING ARRANGEMENT: Provision for sealing secondary terminal compartment, primary ratio change strips (if any) and tank effectively shall be made such that no fraud etc. such as tampering of the ratio or circuit (current) is possible. The holes provided for the above sealing provision shall be of adequate size and pass the sealing wire of about 14 SWG.

1.6. Each instrument Transformer 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.

1.7. 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.

1.8. The units shall be vacuum filled with oil, after processing and thereafter hermetically sealed to eliminate air and moisture from entering the tank.

1.9 NAME/RATING PLATE :

Each Current Transformer shall have the following particulars indelibly marked on it or on a label permanently secure to it or its casing.

- a) Manufacturer's Name :
- b) Manufacturer's Sl.No. and /or type of designation:
- c) Rated transformation ratio :
- d) Rated Frequency
- e) Highest system voltage
- f) Insulation level and
- g) Rated short time thermal current with the associated rate time and rated dynamic current.

The Purchase Order No. and date and year of supply and the words "APTRANSCO" must be etched on the name plate.

III. SCHEDULE OF EQUIPMENT

1. CIRCUIT BREAKERS :

Vacuum Circuit Breaker complete with suitable painted steel support structure (with anchor bolts & nuts) for mounting 1 No. circuit breaker – 3 poles. Mechanism box, and Current Transformers.

- Note :
- a) Earth strips as per IS shall be provided for proper earthing of equipments.
 - b) Earth bar of copper (suitable for termination of 2 Nos. 40 * 6 mm Flats) shall be provided on Circuit breaker support structure.
 - c) Connecting Cable from Breaker to CTs are to be provided.
 - (i) Connecting Cable from Breaker to CTs 6 Core cable of 5 mtrs length from each CT i.e., total 3 x 5 = 15 mtrs / Breaker.
 - (ii) Size of Control cable is 2.5 Sq mm. (unarmoured copper cable)

2. MECHANISM BOX CONTAINING :

- a) Operating mechanism
- b) Mechanical indicator for "ON" and "OFF" coupled to the Circuit breaker operating mechanism.
- c) Mechanical close and trip (with protective flap) lever/push button.
- d) Terminal blocks for control wiring and a spare terminal block (with 20% of the active terminals).
- e) Operation Counter.

- f) Operating handle for manual charging of springs and for slow closing.
- g) 2 Nos. cable glands over and above those provided for control cables with suitable dummies.
- h) Not less than 4 numbers normally open and 4 normally lose spare auxiliary contacts over and above those required for normal operation.
- i) 250 V single phase AC Motor/Manual operated spring charging mechanism complete with electrical spring release coil, 2 Nos. shunt trip coil and 1 No. closing coil.
- j) Local – Remote selector switch.
- k) Earth bar (suitable for termination of 2 Nos. 50 x 6 mm class)
- l) 6 Nos. Terminal connectors suitable for panther conductor for incoming and outgoing connector for outdoor VCB.
- m) Set of 2 pole MCBs for AC and DC supply with different colours.
- n) 1 No. of reputed make anti-pumping relay.
If offered breaker is with anti pumping mechanism plug in relay is also acceptable.
- o) TNC Switch heavy duty piston grip type

3. CURRENT TRANSFORMERS.

Three numbers outdoor CTs as specified.

- 4. Terminals connectors suitable for panther ACSR conductor shall be supplied for Circuit Breaker (6 Nos.) and CT terminals (6 Nos.)

Suitable inter connection between circuit breaker terminals and CT terminals are to be provided.

Note : Other standard accessories which are not specifically mentioned but supplied with breakers of similar type and rating for efficient and trouble free operation shall be provided.

IV. TESTS :

The Circuit breakers and current transformers shall be subjected to the following routine and type tests in accordance with the details specified in the relevant Indian Standards as amended from time to time or any other equivalent international standards.

- 1. **CIRCUIT BREAKER : IS 13118/IEC 62271-100/2008 Latest version.**

Copy of type test certificates shall be enclosed to the tender. The date of type test certificates shall not be later than **5 years as on the date of bid opening.**

1.1. ROUTINE TESTS :

- a) Measurement of resistance of the main circuits.
- b) Operation tests.

- c) One minute power frequency voltage dry withstand test on the circuit breakers.
- d) One minute power frequency voltage dry withstand test on auxilliary circuits.

1.2 **TYPE TESTS :Tests shall be done as per IS or IEC.**

- a) Temperature rise test for the main circuits.
- b) Measurement of resistance of the main circuit.
- c) Operation tests.
- d) Mechanical endurance tests (M2 class suitable for 10000 operations).
- e) Impulse voltage tests.
- f) One minute power frequency voltage dry withstand tests.
- g) One minute power frequency voltage wet withstand tests.
- h) Tests for short circuit conditions.
- i) Tests for short time current.
- j) Seismic switching duty test
- k) Capacitor switching duty test.

1.3 **ACCEPTANCE TESTS :**

The inspecting officer shall carryout acceptance test on 10% of circuit breakers, randomly chosen from the offered lot.

The acceptance tests shall be as follows:

- a) Measurement of resistance of main circuit.
- b) Operation test. This shall comprise five operation test cycles.
- c) One minute power frequency voltage dry withstand test on the circuit breaker.
- d) One minute power frequency dry withstand test on Auxiliary circuit.

The method of carrying out the above acceptance tests shall be as per IS : 13118/1991. Test parameters wherever applicable shall be as per this IS.

2. **CURRENT TRANSFORMERS:**

2.1. The following Type tests as per IS 2705 (Latest version) shall be conducted and Type Test Certificates for the tests shall be enclosed along with the tender. The date of type tests shall not be later than **5 years as on the date of bid opening.**

- a) Short time current Test.
- b) Temperature rise test.
- c) Lightning Impulse Test.
- d) High Voltage Power frequency wet withstand voltage test.
- e) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class.

2.2 **ACCEPTANCE & ROUTINE TESTS:** The following tests shall be conducted as per IS:2705: 1992.

- a) Verification of terminal marking and polarity.
- b) Power frequency dry withstand Test on primary & secondary windings.

- c) Over Voltage Interturn test.
- d) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class.

Note: Satisfactory Valid type test certificates from Central Govt. /NABL/International labs is to be furnished for the tests mentioned above as per the specification in line with relevant specifications along with tender bid. For type tests applicable as per IS:13118 or IEC-62271-100. The bid without required type test certificates, the offer shall be treated as non-responsive. Provisional/in house type testing reports are not acceptable.

V SPECIAL GUARANTEE FOR CIRCUIT BREAKERS :

- i) The Circuit Breakers (total equipment) shall be guaranteed for satisfactory operation for a period of 5 years from the date of receipt at stores.

VI DRAWING AND LITERATURE :

Drawings and technical literature of Breakers, Current Transformers shall be enclosed to the offer, Tenders not accompanied by the above are liable to be rejected. These drawings and literature are to be supplied in duplicate copies along with each unit in the event of order. One set of reproducible drawings shall be supplied. Schematic wiring diagrams of the control circuits of the circuit breaker shall be displayed (embossed on a plate/Laminated) on the doors of the circuit breaker and control cubicle respectively.

VII OVERALL DIMENSIONS AND FOUNDATION DETAILS:

The manufacturer shall give the necessary information as regards the overall dimensions of the circuit breaker and foundation details.

VIII PACKING :

All the equipments shall be packed in suitable crates with suitable steel bands so as to withstand rough handling and storage at destination.

IX. SPARE PARTS:

A list of recommended spares including vacuum interrupters may be indicated for operation of each type breaker along with their prices.

GUARANTEED TECHNICAL PARTICULARS FOR CIRCUIT BREAKERS

33 KV

1 RATED VALUES AND CHARACTERISTICS :

- a) No. of Poles
 - b) Manufacturer's Type & Designation
 - c) Rated Voltage
 - d) Rated Insulation-Level.
 - i) Impulse withstand voltage
 - ii) One minute Power frequency withstand voltage.
 - iii) One minute Power frequency withstand voltage on Auxiliary wiring.
 - e) Rated Frequency.
 - f) Rated Normal Current
 - g) Rated Cable charging current
 - h) Rated (Single) Capacitor breaking current
 - i) Rated Small Inductive breaking current
 - j) Rated Symmetrical Short Circuit breaking Current and breaking capacity in MVA.
 - k) Rated Transient Recovery Voltage.
 - l) Rated short Circuit making current
 - m) Rated Operating Sequency
 - n) Rated duration of short circuit
 - o) Opening time and Break time (milli Sec.)
 - p) Closing Time (Milli Sec.)
- 2 Whether type test Certificate enclosed with the Tender.
 3. weight of complete Circuit Breaker :
 4.
 - i) Pressure maintained in vacuum chamber.
 - ii) Gap between the contacts in Vacuum.
 - iii) Area of contacts.
 - iv) The voltage to which the circuit breaker shall be capable of withstanding indefinitely across open contacts.
 5. Minimum Clearance in air
 - i) Between Poles
 - ii) Between Live parts to earth

6. OPERATING MECHANISM OF CIRCUIT BREAKER AND ASSOCIATED EQUIPMENT :

1. Type of closing mechanism.
2. Whether Circuit breaker is Fixed trip or Trip free.
3. No. and type of auxiliary contacts (No. of spare normally open contacts and No. of spare normally closed contacts are to be indicated).
4. Power requirement :
 - i) Closing coil
 - ii) Opening coil
5. Electrical service life :
 - i) Rated Current (times)
 - ii) Rated interruption current (times)
6. Periodicity of maintenance for the following :

For maintaining Vacuum in interrupting Chamber.

 - 1) For maintaining Vacuum in Interrupting chamber.
 - 2) For changing contacts.
 - 3) Other maintenance schedules if any.

II. GUARANTEED TECHNICAL PARTICULARS FOR CURRENT TRANSFORMERS

33 KV 400-200-100/1-1A

1. Type
2. Manufacturer's Type & designation
3. Rated Voltage
4. Rated Primary current
5. Rated secondary current
 - Core I
 - Core II
6. No. of cores (Secondary core details)
7. Rated Output in VA
 - Core I
 - Core II
8. Class of accuracy
 - Core I
 - Core II
9. Accuracy Limiting factor
 - Core I
 - Core II
10. Method of ratio change and secondary connection details & connection diagram.
11. Secondary voltage
 - Core I
 - Core II
12. Secondary Limiting Voltage
 - Core I
 - Core II
13. One second short time current
14. Rated current dynamic (Peak value)
15. Rated continuous thermal current temp. rise over ambient.
16. One minute power frequency Dry/ Wet withstand voltage in KV (r.m.s.)
17. 1/50 micro sec. Impulse withstand test voltage in KV (Peak)
18. One minute power frequency withstand test voltage on secondaries in KV (r.m.s.)
19. Weight of Oil in Kg.
20. Total weight in Kg.
21. Magnetization curve of CT core.
22. Mounting details
23. Overall dimensions.