

## **SECTION -III (PART-A)**

### **TECHNICAL SPECIFICATION FOR 36 KV OUTDOOR VACUUM CIRCUIT BREAKERS AGAINST TN-2376**

#### **1. SCOPE :**

This specification is intended to cover the design, manufacture, assembly, testing at manufacturer's works, supply, delivery, installation & commissioning (As per Section-III Part-B) of 36 KV Outdoor Vacuum Circuit Breakers Complete with all materials and accessories for efficient and trouble free operation.

1.1 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 and shall be capable of performing in continuous commercial operation upto the Bidder's guarantee in a manner acceptable to the Purchaser, who will interpret the meanings of drawings and specifications and shall have the power to reject any work or material which in his judgment is not in accordance therewith. The offered equipment shall be complete with all components necessary for its effective and trouble free operation along with associated equipments, interlocks, protection schemes etc. Such components shall be deemed to be within the scope of supply, irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.

#### **2.0 STANDARDS :**

2.1 The circuit breaker shall conform to the latest revisions with amendments available at the time of testing of relevant standards, rules and codes, some of which are listed herein for ready reference:-.

IS:13118/IS-3427/ IS:10118 (Part-III) – 1982/ IS:2165-1977/ IS:3716-1976/ IEC- 62271-100/ IEC-62271- 200 (with latest amendments)	Circuit Breaker/ metal enclosed Switchgear and control gear.
IS: 3156	Voltage transformers.
IS: 2705	Current transformers.
IS: 3231	Electrical Relays for power system.
IS:1248	Meters and Instruments
IS:14697-1999	Specification for AC static transformer operated watt hour and VAR hour meters class 0.2 S & 0.5 S.

IEC-62053-22-2003 IEC-62052-11-2003	Specification for AC Static Watt hour Meters, class 0.2 S & 0.5 S.
CBIP Technical Report No.88 revised July, 1996 read with amendment issued (April,99, September,99 and also any other amendment thereafter).	Specification for AC Static Electrical Energy Meter.

2.2 Equipment meeting with the requirements of any other authoritative standards, which ensure equal or better quality than the standard mentioned above shall also be acceptable. If the equipment offered by the Bidder conforms to any other standard adopted and the specific standards shall be clearly brought out in relevant schedule. Four copies of such standards with authentic English Translations, shall be furnished along with the offer.

### 3. **CLIMATIC CONDITIONS :**

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

- |  |                                  |
|--|----------------------------------|
| i) Peak ambient air temperature in shade.                | 50 DEG C                         |
| ii) Minimum ambient air temperature in shade             | (-) 5 DEG C                      |
| iii) Maximum relative humidity.                          | 95 %                             |
| iv) Minimum relative humidity                            | 10 %                             |
| v) Dust storms are liable to occur during the period     | from March to July               |
| vi) Height above mean sea level                          | less than 1000M                  |
| vii) Average number of thunder storm days per annum.     | 40 DAYS                          |
| viii) Average annual rainfall                            | 10-100 cm<br>(Depending on area) |
| ix) Number of months of tropical monsoon conditions p.a. | 4                                |

Note :

Climate may be moderately hot and humid tropical conducive to rust and fungus growth. The climatic conditions are also prone to wide variations in ambient conditions. Smoke is also present in the atmosphere. Heavy lightning also occurs during June to October.

#### 4. **PRINCIPAL PARAMETERS OF CIRCUIT BREAKERS :**

4.1	TYPE AND RATING	36 KV
4.1.1	Type	Vacuum Circuit Breaker
4.1.2	Service	Outdoor
4.1.3	Pole	3
4.1.4	Rated voltage (nominal/max.)	33/36 KV
4.1.5	Rated frequency	50 Hz
4.1.6	System Neutral earthing	Effectively grounded.
4.1.7	INSULTATION LEVEL	
4.1.7.1	Impulse withstand voltage	170 KVp
4.1.7.2	One minute power frequency withstand voltage.	70 KV rms
4.1.8	Rated Current	
4.1.8.1	Continuous at 50 C.	1250 A
4.1.8.2	Short time current for 3 Sec.	25 kA
4.1.9	Rated Breaking Capacity	
4.1.9.1	Symmeterical	25 KA
4.1.9.2	Asymmeterical	As per relevant standard
4.1.10	Rated making capacity	2.5 x 25 KA
4.1.11	Rated short time with stand current for 3 secs.	25 KA
4.1.12	a) Total break time b) Total closing time	3 cycles(Max.) 4 cycles (Max.)
4.1.13	Creepage distance	900 mm or more
4.1.14	Mounting.	Steel Pedestal.

4.1.15	Operating duty For gang operation	O-0.3Sec.-CO-3min-CO
4.1.16	Operating Mechanism	Motor operated Spring charged closing mechanism or magnetic actuator.
4.1.17	Auxiliary voltage.	110 VDC
4.1.17.1	Spring charging Motor	230V/415V AC
4.1.17.2	Heater/Lamp/Socket.	230V AC
4.1.18	Terminal Connector	
4.1.18.1	Type	Bimetallic/ Alluminium Alloy Type clamp suitable for both horizontal /vertical take off
4.1.18.2	Suitable for ACSR Conductor	10% Panther and 90% Dog Conductor
4.2	System details	
4.2.1	H.V. System Voltage (Nominal/Max.)	33 KV /36 KV
	Phases	3
	System Neutral	Effectively earthed.
	Fault level	25 KA rms Symmetrical
4.2.2	Auxiliary power Supply	
4.2.2.1	A.C. Supply	1. 415 volts 3 ph 4 W 50 Hz
4.2.2.2	D.C.Supply	2. 230V 1 Ph 2 W 50 Hz 110 V 2 wire.
4.3	Supply point.	

4.3.1 Auxiliary power supplies listed above will be made available to each circuit breaker as below :

AC supply.	Single feeder.
DC supply.	Single feeder.

4.3.2 Isolating switch fuse unit shall be provided at the circuit breaker for each incoming supply. For DC supply double pole throw switch shall be provided.

## 5. **GENERAL TECHNICAL REQUIREMENTS :**

### 5.1 DESIGN CRITERIA :

The 36 KV Outdoor VCBs shall be conforming to M-2 Class. The equipment will be used in high voltage system having characteristics as listed in the specification. The equipment will be installed outdoor in a 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 even at an ambient temperature of 50 Deg.C.

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.

### 5.2 SPECIFIC REQUIREMENTS :

5.2.1 The circuit breaker shall be for outdoor installation, three pole vacuum type, having internal isolation without any sequential interlock.

The duty of the circuit breaker shall involve satisfactory interruption of short circuit currents as listed in the specification.

### 5.2.2 CONSTRUCTIONAL FEATURE :

Each circuit breaker shall comprise three identical poles, complete with a gang operated mechanism for specified duty.

All these poles of circuit breaker shall be linked together electrically and mechanically for specified duty.

The circuit breaker units shall be complete with operating mechanism and other accessories and materials to ensure complete assembly and proper functioning. The following features should be ensured:-

- a) Hinges of door shall be concealed type to avoid rusting and obstructive opening of the door. However, in case hinges are made of brass, then same may or may not be of concealed type.
- b) The quality of welding shall be good and there should not be any lumps and splatters on the panel”.
- c) All the connecting bus bar and current carrying parts shall be made of copper.
- d) All the gasket shall be of chemically treated neoprene.
- e) Hole & Pin locking (Check nut) arrangement should also be provided while fixing the vacuum interrupter at bottom side.
- f) The vacuum interrupter should be housed in Epoxy Pole/ Porcelain bushing units and make of Vacuum Interrupter is required to be from BEL,CGL,SIEMENS,ABB, ALSTOM/AREVA, MEGAWIN, TOSHIBA. Any other equivalent make of V.I. shall also be acceptable subject to prior approval of S.E. (MM), JVVNL, Jaipur.

### 5.2.3 BUS BAR, MAIN CONTACTS AND ARC QUENCHING CHAMBER :

The busses within the cubical shall be of high conductivity electrolyte grade copper. The Bus bar joints shall be silver plated and bolted in such a manner that initial contact pressure around the square headed high tensile bolt will remain substantially undiminished at all temperature upto rated full load temperature. The Bus support and bushings shall be of epoxy resin cast type. All drop off from main bus to VCB and VCB to bushing terminations shall be suitable for current rating of circuit breaker . All the bus bar shall be sleeved with heat shrinkable sleeves of 36 KV voltage level (Insulated for a service voltage of 36 KV) and bus bar shall be shrouded wherever possible. All the bus bar joints shall be shrouded and where shrouding is not possible, it shall be taped with HV self amalgamation tape. All the tap off bus bar connections inside panel and PT jumpers shall be sleeved with HT heat shrinkable sleeves. Special care shall be taken in the design of bus bar system to provide for thermal expansion and to minimize the chances of bus fault. Bimetallic washers shall be provided at the joints of two different metal surfaces.

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 welding.

The tips of the arcing and main contacts shall be heavily silver plated (Min. 40 microns) or made of copper chromium alloy.

The contacts shall be adjustable to allow for wear, shall be easily replaceable and shall have minimum movable parts 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.

#### 5.2.4 AUXILIARY CONTACTS :

Each breaker shall be provided with eight normally open & eight normally closed electrically separate auxiliary contacts. These shall be in addition to those required for its own operation and indication.

The auxiliary contacts shall be convertible type so that normally open contacts can be converted into normally close contact and vice versa at site.

The auxiliary contacts shall be rated 10A at 240V AC and 4A at 110 V DC.

#### 5.2.5 INTERLOCK :

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

#### 5.2.6 INSULATOR :

Insulator shall be wet process porcelain, brown glazed and free from all blemishes. Metal parts and hardware shall be hot dip galvanised/ aluminium anodized.

Insulator 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.

The bushing shall not be subjected to direct point loading. They shall be provided with neck around clamps for evenly distributed pressure.

The bushing shall be mounted using suitable clamps and gasket arrangement to provide required degree of protection.

The bushing assembly shall be provided with lock nut and check nut which will be non-magnetic and non-corrosive.

The provision shall be kept on roof bushing assembly to adopt arcing horn.

The lifting arrangement shall not cause any effective loss of creepage distance/ phase to earth clearances as specified in the ISS/IEC.

#### 5.2.7 OPERATING MECHANISM :

Operating mechanism shall be spring operated with anti pumping and trip free features, complete with shunt trip coils. All three breaker poles shall operate simultaneously. Circuit breakers shall have provision so as to be suitable for three phase auto reclosing. In case of spring closing mechanism, no main spring of the mechanism shall be plated, powder coated or given any other treatment, so that spring property is not lost. The motor shall be universal type suitable for 220/240V. Spring Charge Indication Lamp shall be provided.

The mechanism shall be designed for electrical control from remote as well as local position. In addition to this, local manual trip button shall be provided. Operation counter and mechanical ON-OFF indicator shall be provided.

#### 5.2.8 CONTROL CUBICLE :

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 be IP-55 of gasketed weatherproof construction, fabricated from sheet steel minimum 3 mm thick.

The cubicle shall have front access door with lock and keys, and removable gland plate at the bottom for owner's cable entry. Thermostat controlled space heater, internal illumination lamp 3 pin 5 A socket with individual ON-OFF switches shall be provided in the cubicle.



For local operation following shall be provided :

- a) Local/Remote selector switch.
- b) Trip normal close control switches with pistol grip handle.

All electrical, mechanical connections between the control cubicle and individual poles shall be furnished.

#### 5.2.9 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 650V grade, PVC insulated, switch board wires with 2.5 sq.mm stranded copper conductor. 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.

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

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

#### 5.2.10 TERMINAL BLOCKS :

Terminal blocks shall be 650 V grade, box clamp type ELMEX 10 sq.mm or approved equal. Not more than two wires shall be connected to any terminal. Spare terminals equal in number to 20% of 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 consecutive terminals.

#### 5.2.11 TYPE OF MOUNTING :

The circuit breaker shall be suitable for mounting on fabricated galvanised steel pedestal which shall be supplied along with the breakers. CT mounting bracket will also be supplied along with the breaker and shall be galvanised.

### 5.2.12 TERMINAL CONNECTORS :

1250 Amp. current rating terminal connectors of the circuit breakers suitable for connecting to ACSR Panther and Dog Conductor shall be supplied along with the breakers. Suitable earth connectors for earthing connections shall also be supplied with the circuit breakers. The terminal connectors shall conform to relevant standard IS-5561.

### 5.3 FITTING AND ACCESSORIES :

Each circuit breaker shall be furnished complete with fittings and accessories as listed below :

- 5.3.1 Clamp type bimetallic/Aluminium Alloy terminal connectors suitable for ACSR Panther and Dog Conductor suitable both for horizontal & vertical take off.
- 5.3.2 Two ground pads suitable for termination of 50 x 6 mm flats.
- 5.3.3 Complete mounting steel pedestal along with CT mounting bracket.
- 5.3.4 Operating mechanism, double tripping coils and closing coil.
- 5.3.5 Auxiliary contacts and relays.
- 5.3.6 Local/remote selector switch, trip normal close control pistol control switch.
- 5.3.7 Manual tripping devices with protective flap for VCB's only mechanical ON-OFF indicator.
- 5.3.8 Operation counter.
- 5.3.9 Weather proof outdoor type control cubicle and pole boxes. Set of switch fuse units for AC and DC supply.
- 5.3.10 Space heater with thermostat and ON-OFF switch.
- 5.3.11 Cubicle illumination lamps with ON-OFF switch.
- 5.3.12 3 Pin 5A socket with ON-OFF switch.
- 5.3.13 Terminal blocks and internal wiring - lot as required.
- 5.3.14 Set of prefabricated pipe, fittings, clamps, hardware, interconnecting wires/cables etc. for connection between control cubicle and pole boxes as may be required to complete.

- 5.3.15 Interconnecting wires, GI conduits and accessories for connection between control cubicle and pole boxes.
- 5.3.16 Other standard accessories which are not specifically mentioned but are required to be supplied with breakers of similar type and rating for efficient and trouble free operation.

#### **5.4 PAINTING & FINISHING**

All interiors and exteriors of switchgear enclosure, breaker mechanism etc shall be finished and painted to produce a neat, fire resistant and durable surface which would prevent rusting and corrosion. Sheet metal component shall be pre-treated using 7 tank phosphating process consisting of de-greasing, acid pickling, de-rusting, phosphating and passivation including repeated rinsing in between. On completion of the passivation of the components, they shall be preheated and then epoxy power coated or treated with one coat of primer & zinc chromate and finished with two coats of light gray enamel paint of shade 631 of IS 5 and stoved to achieve excellent anti-rusting and scratch resistant properties. The thickness of painting shall be around 60 microns.

#### **6.0 TESTS:**

- 6.1 TEST BEFORE DESPATCH : The 36 KV circuit breakers and accessories shall be subjected to the following tests as per relevant IS/IEC before despatch at manufacture's works ,.

##### **A) ROUTINE TESTS ON EACH UNIT AS PER RELEVANT STANDARDS :**

- (i) One minute power frequency voltage withstand dry test on main circuit.
- (ii) Voltage withstand test on control & auxiliary circuits.
- (iii) Measurement of the resistance of main circuit.
- (iv) Mechanical operating test as per M-2 class.
- (v) Design and visual checks.

##### **B) TYPE TESTS CONDUCTED ON ONE UNIT OF EACH RATING AS PER RELEVANT STANDARDS:**

- (i) Dielectric tests.
  - a) Lightning Impulse Voltage Test.
  - b) One Minute Power Frequency Test (Wet & Dry).
- (ii) Short time withstand current and peak withstand current test.
- (iii) Basic short circuit duties test.
- (iv) Single phase short circuit test.

- (v) Mechanical Operation Test as per M-2 class.
- (vi) Out of phase making & breaking test.
- (vii) Capacitive current switching test.
  - a) Cable Charging Test.
  - b) Single Capacitor Bank Current Switching Test.
- (viii) Measurement of resistance of main circuit.
- (ix) Temp.rise test.
- (x) IP-55 test (for cubical/control cabinet).
- (xi) Any other type tests not specified above but covered as per amendment/latest edition of relevant IS/IEC.

## 6.2 TYPE TESTS :

The bidder must furnish type test reports along with bid as per the qualification requirement of the Tender Specification.

Where permitted in the relevant standard, a test specimen for type test may be a representative sub-assembly/ a representative functional unit. An individual type test is acceptable for a change of constructional detail, for any change in the design/type of type test report and the design/type of offered against this specification, if the manufacturer can demonstrate and purchaser is satisfied that this change does not influence the result of the individual type test. The bidder may bring out in their offer all such changes made in components, materials, design etc. as the case may be. The purchaser will interpret the meanings of drawings and specifications and shall have the power to accept/reject any type test report which in his judgment is/is not in a manner acceptable to him. **The decision of Purchase Committee in this matter shall be final and binding to all.**

## 6.3 TEST ON BOUGHT OUT ITEMS :

Tests are not required to be performed on bought out equipments/items like motor, terminal connector, CTs, PTs, Relays, Meters etc. at the works of manufacturer. Furnishing Test Certificate of these items from the original equipment manufacturers shall be deemed to be satisfactory evidence. Inspection of the tests at Sub-contractors works will be arranged by the supplier whenever required.

## 6.4 ROUTINE/ACCEPTANCE TESTS :

- (i) The following acceptance and routine tests shall be got conducted in presence of purchaser's representative as per stipulation of the relevant standards, on each unit.

- a) One minute power frequency voltage withstand dry test on main circuit.
- b) Voltage withstand test on control & auxiliary circuits.
- c) Measurement of the resistance of main circuit.
- d) Mechanical operating test as per M-2 class.
- e) Design and visual checks
- f) Any other test not specified above but covered as per amendment/latest edition of relevant IS/IEC.

#### 6.5 TOLERANCE ON TEST RESULTS :

As per relevant standards/specification.

#### 6.6 TEST AT SITE :

The purchaser reserves the right to conduct all tests on 36 KV circuit breakers after arrival at site and the contractor shall guarantee test certificate figures under actual service conditions.

#### 7.0 **INSPECTION :**

All the tests (as mentioned at Clause 6.4) and Inspection shall be made at the place of manufacturer unless otherwise especially agreed upon by the bidder and purchaser at the time of purchase. The bidder shall afford the inspection officer(s) representing the purchaser all reasonable facilities without charges, to satisfy him that the material is being furnished in accordance with this specification. The purchaser has the right to have the tests carried out at his own cost by an independent agency whenever there is a dispute regarding the quality of supply.

The Inspection may be carried out by the purchaser at any stage of manufacture/ before despatch as per relevant standard.

Inspection and acceptance of any material under the specification by the purchaser, shall not relieve the bidder of his obligation of supplying material in accordance with the specification and shall not prevent subsequent rejection if the material is found to be defective. The Bidder shall keep the purchaser informed in advance, about manufacturing programme so that arrangements can be made for inspection.

The purchaser reserves the right to insist for witnessing the acceptance/ routine testings of the bought out items.

The Bidder shall give 15 days advance intimation to enable the purchaser to depute his representative for witnessing the acceptance and routine tests.

## **8.0 QUALITY ASSURANCE PLAN :**

8.1 The tenderer shall invariably furnish following information along with his offer, failing which his offer shall be liable for rejection. Information shall be separately given for individual type of equipment offered.

(i) Statement giving list of important raw materials 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 tenderer'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.

(iv) Level of automation achieved and list of areas where manual processing 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 tenderer for final testing of equipment specified and test plant limitation. If any, vis-a-vis the type, special acceptance and routine tests specified in the relevant standards. These limitations shall be very clearly brought out in schedule of deviations from specified test requirements.

8.2 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 purchasers hold points shall be discussed between the purchaser and supplier before the QAP is finalized.

- 8.3 The successful bidder shall submit the routine test certificates of bought out accessories and central excise passes for raw material viz. oil, copper, aluminum, conductors, insulating materials, core material at the time of routine testing of the fully assembled equipment.

## **9.0 DOCUMENTATION :**

- 9.1 All drawings shall conform to International Standards Organisation (ISO) 'A', series of drawing sheet / specification, Standards specification IEC-56/IS-13118 & relevant standards. All drawings shall be in ink and suitable for micro filming. All dimensions and data shall be in S.I Units.

- 9.2 List of drawings and documents :

The bidder shall furnish four sets of following drawings along with his offer.

- a) General outline and assembly drawings of the equipment.
- b) Graphs showing the performance of equipments in regard to magnetization characteristics.
- c) Sectional views showing -
  - i) General Constructional features.
  - ii) the materials/ gaskets /sealings used.
  - iii) the insulation, the winding arrangements, method of connection of the primary/secondary winding to the primary/secondary terminals etc.
  - iv) porcelain used and its dimensions along with the mechanical and electrical characteristics.
- d) arrangement of terminal's and details of connection studs provided.
- e) Name / Rating Plate
- f) Schematic Wiring drawing with write up.
- 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.

All items of equipment included in this specification shall be provided with rating plates as per relevant standards and in addition with following particulars :

- i) Name & Address of Supplier
- ii) Telephone No.
- iii) Fax No.
- iv) Date of Despatch
- v) Date of Expiry of Warranty
- vi) Name of Purchaser
- vii) TN No.

- 9.3 The successful tenderer shall submit within 2 weeks of placement of order, four sets of final versions of all the above said drawings for purchaser's approval. The purchaser shall communicate his comments/approval on the drawings to the supplier within four weeks. The supplier shall, if necessary, modify the drawings and resubmit three copies of the modified drawings for purchaser's approval with in two weeks from the date of owner's comments. After receipt of purchaser's approval, the supplier shall within two weeks, submit 12 prints and two good quality reproducible of the approved drawings for purchasers use.
- 9.4 Three sets of the type test reports, duly approved by the purchaser, shall be submitted by the supplier before commencement of supply. Adequate copies of acceptance and routine test certificate, duly approved by the purchaser shall accompany the despatch consignment.
- 9.5 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.
- 9.6 16 sets of nicely printed and bound volumes of operation, maintenance and erection manuals in English language, for each type and rating of equipment supplied shall be submitted by the supplier for distribution, prior to the despatch of the equipment. The manual shall contain all the drawings and information required for erection, operation and maintenance of the circuit breaker. The manual shall also contain a set of all the approved drawings, type test reports etc.
- 9.7 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 judgement is not in full accordance therewith.

#### **10. PACKING AND FORWARDING :**

10.1 The equipments shall be packed in crates suitable for vertical/horizontal transport as the case may be, and suitable to withstand handling during transport and outdoor storage during transit. 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 symbol. 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.

10.2 Each consignment shall be accompanied with 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.

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

#### **11.0 Optional Spares :**

The bidder shall also recommend optional spares that will be required for breakers along with their total and unit prices. However, the prices of optional spares will not be considered for bid evaluation.

#### **12.0 OPTIONAL TOOLS AND TACKLES :**

The bidder shall also recommend optional tools and tackle that be required for general maintenance and operation of circuit breakers, along with their total and unit prices.

However, the prices of these tools and tackle shall not be considered for bid evaluation.

### 13.0 **PERFORMANCE WARRANTY PERIOD :**

The performance warranty period shall be 5 (Five) years from the date of receipt of equipment along with all accessories.

The supplier will be required to furnish a Performance Bank Guarantee @ 10% (for new suppliers)/ @ 5% (for old & established suppliers) amount of the total ordered value, which is required to be valid for 5 years.

Successful bidder shall attend the complaint within 30 days from the date of receipt of complaint. The date of receipt of complaint shall be treated as the date of FAX/ 3 days from the date of despatch of complaint by the field officer/ stores/ Purchaser. If the supplier fails to attend the complaint within 30 days from the date of receipt of complaint intimated by the field officer/ purchaser then penalty @1/4% per week or part thereof for first 4 weeks in case delay is exceeds more than 4 weeks then @1/2% per week or part thereof shall be charged for entire delay, subject to a maximum of 5% of ex-works supply price of the breaker. This penalty will be in addition to the penalty leviable delay in delivery mentioned in purchase order.

Further to this, in case of emergency, breaker can be get rectified by the field officer at the risk & cost of the supplier firm. The rectification of breaker means satisfactory performance report duly signed by the field officer (AEn/JEn) i.e. incharge of 33/11 KV Sub-Station.

### 14.0 **Delay in Delivery of Inspected Material at Store :**

If the material are not delivered within 7 days at same station, 14 days for station within State and 20 days by the suppliers situated outside the State from the date of receipt of the Dispatch Instructions. Charges shall be recovered @ Half Percent per week or part thereof (for actual delay in receipt), maximum upto 3% of the Dispatch Instructions consignment value (Ex-works). This will be in addition to Clause No.1.24(1) of GCC.

### 15.0 **PAYMENT:-**

90% (Ninety percent) payment of each consignment shall be made along with taxes & duties by the Sr. Accounts Officer (CPC), Jaipur Discom, Jaipur subject to furnishing of SBG & PBG in terms of relevant clause of GCC and clause No. 3.29 of the Specification and production of receipted challan duly verified by the consignee. 10% payment shall

be released on production of satisfactory installation & commissioning report of VCB duly verified by the Nodal Officer. However, if intimation of site is not conveyed to the supplier by the Nigam upto one year of receipt of material in store, retention amount of supply of VCB, may be released.

However, successful bidder may furnish Bank Guarantee equivalent to 10% amount of breakers towards successful Installation & Commissioning and in such case, no payment from the supply bills shall be deducted.

#### **16.0 FURNISHING OF PROTO TYPE BREAKER:-**

One Proto Type 36 KV Outdoor VCB conforming to various requirements of technical specification along with subsequent modifications made, has to be supplied by the successful bidder within two months of placement of detailed purchase order for our inspection & approval. The offer for inspection of subsequent material shall be entertained only after approval of proto type VCB Kiosk and successful bidder will have to complete the entire ordered quantity within **six months** of approval of proto type VCB. Prior to supply of prototype VCB, the detailed drawings, Bill of Material & protection scheme shall be got approved.

In case if there is delay in furnishing of proto type VCB by the firm for our inspection beyond 60 days, the delivery schedule shall be reduced by the number of days for which above delay was occurred. Further, in case successful bidder does not get its proto type approved within one year from the date of receipt of detailed Purchase Order or initial contractual delivery period whichever occurs earlier, then in such case it will be treated as failure of supply of material on part of the firm and action as per the provision of P.O. will be initiated.

The proto type sample shall be inspected by a team of two officers including one from M&P Wing.

If the bidder has already got approved Proto type sample in the previous tender with similar specification of the instant tender, furnishing of fresh proto type sample is not required.

#### **17.0 QUANTITY:**

##### **36 KV OUTDOOR VACUUM CIRCUIT BREAKERS - 50 Nos.**

The quantity as indicated above is approximate and may be increased or decreased to any extent at the time of finalization of this tender enquiry.

## **SECTION-III (PART-B)**

### **1 SCOPE**

This specification is intended to cover the installation & commissioning of 36 KV Vacuum Circuit Breaker, complete in all respect at various 33/11 KV Sub-Stations under Jaipur Discom.

### **2.0 INSTALLATION & COMMISSIONING OF VCB**

The 36 KV Vacuum Circuit Breaker supplied shall be installed & commissioned by the successful bidder, at various 33/11 KV Sub-Stations under Jaipur Discom. The name of 33/11 KV Sub-Stations shall be intimated at the time of despatch instructions/ stores.

### **3.0 ACTIVITY**

The following main activities are to be carried out by the supplier for installation & commissioning of 36 KV Vacuum Circuit Breaker:-

- a) Foundation of Bolts along with grouting.
- b) Installation & Commissioning of Breaker.
- c) Laying & connection of control cables from breaker to Control & Relay panel (Control cables shall be supplied by Nigam).
- d) Connection of Earthing of breaker from the earth mesh of the GSS) (The requisite MS Strip will be provided by the supplier and end connection duly welded/ nut bolted with Mesh/Breaker shall be provided)
- e) Civil works related with foundation for installation of 36 KV Breaker.
- f) All civil works related with Installation & Commissioning of 36 KV Breaker.

**Note:- The M.S. Earthing & Foundation bolts required for Installation & Commissioning shall be provided in a packet and shall put up in each breaker.**

### **4.0 CIVIL FOUNDATION WORK:-**

The foundation & grouting work along with all civil works required for installation of 36 KV outdoor vacuum circuit breaker shall be carried out by the supplier. The foundation drawing shall be furnished by the successful bidder(s), which shall be approved by SE(MM) in consultation with SE(Civil).

### **5.0 INSTALLATION & COMMISSIONING OF BREAKER**

Installation & commissioning of 36 KV Vacuum Circuit Breaker complete with accessories including use of special tools &

conducting all pre-commissioning tests before energisation shall be carried out by the supplier. PG/T-Clamps of required size to connect incoming & outgoing terminals of VCB to main bus bar shall be arranged by the supplier, however, required ACSR conductor for jumpers shall be arranged by the respective Nigams.

The agency should engage team of experienced Engineers & skilled staff for the purpose of Installation & Commissioning of 36 KV Vacuum Circuit Breaker.

Mainly following pre-commissioning tests shall be carried out:-

- a) Visual inspection.
- b) Cleaning
- c) Testing of relays/ CTs/PTs.
- d) Testing of current circuitry by primary injection
- e) Testing of breaker by primary injection.
- f) IR value.
- g) Checking of various equipments viz. Ammeter, Voltmeter, Energy meter etc. and alarms/ flags/ trip circuit healthiness etc.

#### 6.0 **NODAL OFFICER:**

The concern Assistant Engineer/Feeder Manager of M&P Wing shall be Nodal officer for supervision of installation & commissioning of 36 KV Vacuum Circuit Breaker.

#### 7.0 **WORK COMPLETION SCHEDULE**

The Installation & Commissioning of 36 KV Vacuum Circuit Breaker shall be completed within 30 days from the date of receipt of intimation of location of 33/11 KV Sub-Stations where the supplied breakers are to be installed.

While issuing the Installation & Commissioning Report, the nodal officer should ensure that activities as per clause No. 3.0 of Section-III (part-B) have been completed by the supplier. If the Installation & Commissioning of Breaker has been done on the existing foundation of the sub-station, then only 50% payment of the total Installation & Commissioning charge shall be admissible and accordingly the payment will be made by the Sr.A.O. (CPC).

#### 8.0 **DELAY IN WORK COMPLETION:**

In case of delay in Installation & Commissioning of breaker beyond 30 days from the date of intimation to the supplier about the site (the date of receipt of intimation shall be treated as the date of FAX/ 3 days from the date of despatch of letter about intimation of site by

the field officer/ stores/ Purchaser), Only 50% payment towards installation & commissioning charges of breaker will be payable and in case the supplier fails to complete installation & commissioning of the breaker within 60 days, no payment towards installation & commissioning will be payable and breaker will be installed & commissioned by the Nigam itself and penalty towards non-installation of breaker @ 10% cost of breaker shall be levied.

The payment shall be released by Sr.A.O. (CPC) on production of satisfactory installation & commissioning report of 36 KV Outdoor Vacuum Circuit Breaker duly verified by the concerned Assistant Engineer of M&P Wing.

While issuing the Installation & Commissioning Report, the nodal officer should ensure that activities as per clause No. 3.0 of Section-III (part-B) have been completed by the supplier. If the Installation & Commissioning of Breaker has been done on the existing foundation of the sub-station, then only 50% payment of the total Installation & Commissioning charge shall be admissible and accordingly the payment will be made by the Sr. A.O. (CPC).

#### 9.0 **PAYMENT:-**

The payment shall be released on production of satisfactory installation & commissioning report of 36 KV Outdoor Vacuum Circuit Breaker duly verified by the Nodal Officer.

#### 10.0 **PRICES:**

Installation & Commissioning charges shall be on FIRM price basis. In the price schedule, the bidder shall quote separately the prices for supply of 36 KV Outdoor Vacuum Circuit Breaker, Installation & Commissioning charges inclusive of all type of taxes & service charges, if any and cost of Civil Works per breaker.

Work Contract Tax (WCT), if applicable, shall be borne by the Nigam.

#### 11.0 **Security bank Guarantee towards Installation & Commissioning:**

Successful bidders shall furnish Bank Guarantee equivalent to 10% cost of breaker, towards successful installation & commissioning, which should be initially valid for a period of one year and if bidders fail to carry out installation & commissioning work of breaker in time, Nigam may invoke their Bank Guarantee.