SCHEDULE–III (PART-A)

TECHNICAL SPECIFICATION OF 36 KV INDOOR TYPE VACUUM CIRCUIT BREAKERS AGAINST TN-2521.

3.0 SCOPE :

This specification covers the design, manufacture, assembly, testing at manufacturer's works before despatch, supply, delivery of 3 pole, 50 Hz, 36 KV switchgear and control gear panels for indoor installation fitted with 36 KV vacuum circuit breakers including voltage transformers, current transformers, metering instruments, protection relays etc. as per schedule of requirement and installation & commissioning by the supplier as per Schedule-III (Part-B). The power system is with neutral solidly earthed. The equipment offered shall be safe, reliable and compact to install. The workmanship shall be of high order. The circuit breaker and protective devices shall be of latest design so as to ensure rapid and efficient interruption of fault current, low arc energy, small arcing time, complete phase segregation and freedom from fire hazards.

3.1 STANDARDS :

The circuit breaker/metal enclosed switchgear, Voltage transformers, current transformers and all other equipment shall also comply with the requirement of latest edition of relevant Indian standards. Deviation from the standards and this specification if any, should be brought out in the tender and justified. Voltage transformer and current transformers shall be mounted within the panels. The governing standard shall be :

S. No.	IS/IEC Reference	Specification
1.	IEC-62271/ 100-200	High Voltage Switchgear & Control gear
2.	IEC-298	A.C. Metal – enclosed and control gear for rated voltages above 1KV and including 72.5KV
3.	IS-3427	A.C. Metal – enclosed and control gear for rated voltages above 1KV and including 52KV.
4.	IS-8623	Specification for Low Voltage Switchgear and Control gear assemblies.
5.	IS-13118 IEC-56	Specification for High Voltage AC Circuit Breakers.
6.	IEC-529	Degrees of Protection.
7.	IS-5578 & 11353	Marking and arrangement for switchgear bus bar main connections and auxiliary wiring.
8.	IS-325	Specification for 3 Phase Induction motors.
9.	IS-2629	Recommended practice for hot dip galvanizing of iron and steel.
10.	IEC-137	Bushing for AC Voltages.
11.	IS-3347	Porcelain Transformer Bushings.
12.	IS-5561	Terminal Connectors
13.	IS-3156	Voltage Transformers

14.	IS-2705	Current Transformers
15.	IS-3231	Electric relays for power protection.
16.	IS-13010	-
17.	IS-13779	Static Energy Meters
18.	IS-8686	Static Protection Relays
19.	IS-1248	Electrical measuring instruments
20.	IS-2099	High Voltage Porcelain Bushings.
21.	IS-10118	Minimum clearances for Outdoor Switchgear.
22.	IEC-694	Common Clauses for High Voltage Switchgear and Control gear.
23.	IEC-60255 & IEC-61330	Numerical Relays
24.	IS:13703-1	LV Fuses for voltages not exceeding 1000 volt AC or 1500 Volt DC
25.	IEC:60279	Low Voltage Power Fuses
26.	IS-2147 or IS-13947 Part-1 **or IEC 60947-1-2004 (with latest amendments)**	Verification of degree of protection IP-55 of enclosure/cubicle/control cabinet

Equipments conforming to any other internationally accepted standard(s) which ensure(s) equal or better quality than the standard(s) mentioned above would also be accepted. In case the tenderers wish to offer equipment conforming to other standards or alternative offer which tenderer considers advisable by reason of his own manufacturing requirement and experience would be acceptable provided descriptive matter, literature and complete certificates are submitted pointing out that the equipment/devices/arrangements as offered are equal or superior to that required by the accompanying specification with full justification. They shall furnish English translation of the relevant standards where the equipment conforms to any other standards. Salient points of difference between the standards adopted and those mentioned above shall be brought out.

3.2 a) PARTICULARS OF SYSTEM :

i) Nominal system voltage : 33 KV
ii) Highest system voltage : 36 KV
iii) Frequency : 50 Hz
iv) No. of phases : 03
v) Neutral earthing : Effectively earthed

b) SERVICE CONDITIONS :

The equipment should operate satisfactorily under the climatic conditions specified in this specification. The reference maximum ambient Air temperature may be taken as 50 Deg. C. as against 40 Deg. C. The permissible temperature rise for various equipments offered should therefore be derated accordingly.

3.2.1 CLIMATIC 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 from 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 (Depending on area)
ix) Number of months of tropical monsoon conditions p.a. June to Sept.

3.3 PRINCIPAL PARAMETERS

3.3.1 CIRCUIT BREAKERS :

a) Rating and characteristics of circuit breakers :

1. No. of poles : 3
2. Class : Indoor
3. Rated voltage : 36 KV
4. Rated insulation level
a) Light-ning impulse voltage : 170 KV (Peak)
b) One minute power frequency withstand voltage. : 70 KV (rms)
5. Rated frequency : 50 Hz
6. Rated normal current : 800 A
7. Short circuit breaking capacity : 25 KA
8. Short time withstand current for 3 secs. : 25 KA
9. Protection class : IP 5X
10. Maximum opening time : Less than 3 Cycles
11. Rated operating sequence : O-0.3 Sec.-CO-3min-CO
12. Minimum operations at full rated short circuit breaking current. : 100
13. Rated Breaking Capacity
i) Symmetrical : 25 KA
ii) Asymmetrical : As per relevant Standards
14. Rated making capacity : 2.50x25 KA
15. Operating Mechanism : Motor operated Spring charged closing mechanism.
16. Heater/Lamp/Socket : 240 V A/C
17. Control Voltage : 110V DC

b) Characteristics of the operating mechanism of Circuit breaker and associated equipment :

i) Method of operation : The circuit breakers shall be equipped with power operated mechanism to operate all the three phases simultaneously using 220/240V universal motor operated spring closing mechanism. The circuit breakers shall also be provided with hand operated spring closing mechanism. The Circuit Breaker shall have electrical and mechanical tripping arrangements under various conditions. 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.

ii) Number and type of spare, auxiliary switches : Adequate number of spare auxiliary switches/ contacts both of normally open and normally close type but not less than eight each shall be provided on the circuit breaker for use in the indication and controlling scheme of the circuit breaker.

iii)Rated supply voltage and rated supply frequency : The rated voltage for the auxiliary supply shall be 240 V, 50 Hz AC supply.

3.3.2 DESIGN CRITERIA

The bidder shall quote 36 KV Indoor type Vacuum Circuit Breakers conforming to M-2 class only. The equipment will be used in high voltage system having characteristics as listed in the specification. The equipment will be installed indoor 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 and this specification.

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.

3.3.3 CONSTRUCTIONAL FEATURES :

a) The circuit breakers shall be triple pole metal clad truck mounted **horizontal drawout type** enclosed in cubicle made of CRCA sheet steel of minimum 3 mm thickness and shall comply with latest edition of relevant IS. The cubicle/ panels shall be vermin proof and dust tight. The cubicle shall be of folded type construction. The switchgears and control gear shall be complete with all necessary supporting frame work, nuts and bolts etc. for securing the same to the floor. The operating mechanism shall operate (close/open) all the three phases simultaneously. The operating mechanism, links etc. should be accessible for maintenance. Mechanical

safety shutters should be provided between breaker and panel. Engagement and disengagement of auxiliary supply should be automatically linked through the movement of the truck so that in service condition auxiliary supply is automatically made. All six terminals shall brought out of cubicle through appropriate class of cable termination and sealing kits. All the breakers shall be supplied with necessary clamps suitable for appropriate current ratings. Suitable arrangement of earthing on the switchgear and control gear panels shall be provided. The arcing contacts shall be made of homogeneous special alloy so that surge voltages are reduced to negligible level and multiple arc reignition is eliminated. All the connecting bus bar & current carrying parts shall be made of copper for these indoor circuit breakers.

b) For indoor panels, SWITCHGEAR (circuit breakers, CTs, PTs etc.) and controlgear (relays, meters etc.) shall be mounted on the same panel. A set of air insulated electrolytic copper bus bars having maximum current density 1.5 Amp./ mm^2 with minimum cross sectional area of 720 mm^2 with PVC sleeves or PVC insulation are to be provided for all indoor switchgear panels. The switchgear panels shall be provided with the arrangement for extending the bus bar and inter-connecting bus bars. Their supports, nuts and bolts etc. will be supplied loose. The region of such inter connection shall normally be blanked on panels. The bus bars should be of electrolytic copper with permissible limits of current density. Size of the bus bar and current density should be specified in the tender. The bus bar conductor shall conform to IS:8034. The bus bar shall be rated for 25KA for 3 Seconds.

c) The following safety interlocks & features are required to be provided in the breaker:-

1) For VCB Chamber

i) Rack in Operation from Test to Service:-

It should not be possible to rack in the VCB Truck unless & until the VCB is in switched off condition, VCB chamber door is closed, LV Control plug is connected & locked and the Cable earthing switch (if provided) is switched off.

ii) Rack Out Operation from Service to Test:-

It should not be possible to rack out the VCB Truck unless & until the VCB is in switched off condition.

iii) For earthing switch in cable chamber:

It should not be possible to operate the earthing switch unless & until the respective VCB Truck is in test condition.

iv) The movement of VCB shall be duly interlocked so that it can not be racked in to service position in pre closed condition & it is not possible to rack out from service position in pre closed condition. Any attempt to close the VCB into intermediate position shall be blocked by sustained mechanical tripped command overriding on to the mechanism to avoid

closure of the contacts of VCB. Any attempt to cause the movement of VCB shall initiate the tripping of a VCB and only thereafter the movement shall be facilitated.

v) The mechanism shall be trip free type with inherent capability of O-CO operation.

vi) The Circuit Breaker should be designed in such a manner that there should be proper metal compartmentalization of the various circuit breaker parts such as breaker chamber, Bus bar chamber & Cable chamber.

vii) Test and service position limit switches shall be provided.

viii) The provision should be made to avoid accidental contact & access to the high electrically stressed area by providing appropriate touch to safe metal screens when the VCB is posed into service position inside the cubical.

ix) No separate VCB handling trolley shall be required to insert the VCB inside the panel. The VCB shall be floor rolling type.

x) The VCB should be provided with proper interlock for the secondary isolating plug & socket type contacts so that it is not possible to insert the VCB from the test to service position unless the secondary plug socket is connected & it is not possible to remove the secondary plug socket into intermediate position & in service position.

xi) The insulation used shall be non hygroscopic & non deformable type and it should be free from any partial discharge when exposed to sustain over voltages.

xii) The VCB shall be completely type tested as per IEC 62271-100/200 or ISS.

xiii) The operating instruments like switches etc shall be placed at height less than 1900mm.

xiv) The total height of the panel should not exceed more than 2700mm and width should not exceed 1200mm.

xv) The panel should be designed totally on air clearances basis with no dependency on the external shrouds & add on insulations.

xvi) The panel shall have epoxy spout insulators between the bus bar & VCB chamber to have proper compartmentalization.

xvii) The bus risers shall be epoxy coated and should be integral part of the spout bushings.

xviii) Entire bus bar compartment is provided with solid insulation scheme to have less dependency on the inter phase barriers.

xix) The panel shall have rigid sheet steel construction for better stability and shall be self standing without the external bracings.

xx) The panel should be designed to have gravity operated self resetting type pressure relief flaps to have internal arc fault proof design.

xxi) The panel should have integral foundation frame.

xxii) The CT's shall be top terminal CT's and mounted on the panel base frame to facilitate easy mounting and serviceability.

xxiii) Adequate cable termination space of around 700mm shall be provided with facility to terminate 3 cables of 3CX400 sq. mm size.

xxiv) Panel should be provided with independently operated, insulated type non metallic shutters with pad locking facility. The shutters shall automatically operate with the VCB trolley movement.

xxv) The multi-core cable entry should be provided optimally from front or rear side of the panel. The necessary arrangement of cable entry from Left Hand/ Right Hand side through self standing side cable boxes should also be made.

xxvi) Hinges of door shall be consealed type to avoid rusting and obstructive opening of the door.

xxvii) The quality of welding shall be good and there should not be any lumps and splatters on the panel".

xxviii) All the gasket shall be of chemically treated neoprene.

xxix) Hole & Pin locking (Check nut) arrangement should also be provided while fixing the vacuum interrupter at bottom side.

3.3.4 VACUUM CIRCUIT BREAKER :

The three phase vacuum circuit breakers will have three interrupters (one interrupter per phase) mounted on same carriage. The interrupters shall be air insulated in epoxy resin tank or with epoxy resin phase barriers. Each interrupter shall have fixed and moving contacts in sealed envelope having vacuum below 10^{-6} torr. The metallic bellow shall permit axial movement of moving contact and act as vacuum seal. The contacts shall have requisite mechanical strength and good electrical and thermal conductivity and shall be made of copper chromium alloy. Complete literature of vacuum bottles shall be furnished with the tender.

The vacuum interrupter should be housed in epoxy pole unit and make of Vacuum Interrupter should be BEL, CGL, SIEMENS, ABB & ALSTOM /AREVA, MEGAWIN, TOSHIBA only. Any other equivalent make of V.I. shall also be acceptable subject to prior approval of S.E. (MM), JVVNL, Jaipur.

3.4 VOLTAGE TRANSFORMERS :

1. Highest equipment voltage	:	36 KV
2. No. of phases	:	3
3. Insulation level		
a) Impulse withstand voltage	:	170 KVP
b) One minute power frequency withstand voltage on :		
i) Primary winding	:	70 KV rms
ii) Secondary winding	:	2 KV rms
4. Frequency	:	50 Hz.
5. Transformation ratio	:	33000/110 V
6. Rated output	:	30 VA / phase
7. Accuracy class	:	0.5
8. Winding connection	:	Star/Star
9. Rated voltage factor	:	1.2 continuous and 1.5 for 30 seconds

10.Type of insulation : Resin cast

VTs shall be provided with HRC type fuses on the secondary side. The VT fuses on primary side shall also be provided with all safety precautions. One of the secondary terminals of the VTs shall be solidly earthed. The panel shall be provided with draw out of 3 Nos. Single Phase Voltage Transformers.

3.5 CURRENT TRANSFORMERS :

1. Rated voltage : 36 KV
2. Insulation level
   a) Impulse withstand voltage : 170 KVP
   b) One minute power frequency voltage on
      i) Primary winding : 70 KV rms
      ii)Secondary winding : 03 KV rms
3. Frequency : 50 Hz
4. Rated continuous thermal current : 120% of rated primary current
5. Short time thermal rating : 25 KA for 3 Sec.
6. Transformer CTs of ratio : 400-200/5-5A.
7. Rated output/accuracy etc. for CTs.

	Core-I	Core-II
a) Rated output However VA burden should not be less than suitable for A.C. series trip requirement with shunt trip arrangement.	30 VA	15 VA
b) Class of accuracy	5P	0.5 S
c) Accuracy limit factor	15	-
d) Purpose	Relaying	Metering
8. Max. instrument security factor	-	5

9. Type of Insulation Resin Cast

36 KV current transformers shall be single phase. The core shall be of high grade non ageing laminated silicon steel of low hysterisis loss and high permeability to ensure high accuracy for both normal and fault current.

3.6 The rating of secondary winding shall be 5 Amps. However, the current transformers will have to satisfy the requirement of rated VA burden, class of accuracy, accuracy limit factor and short time thermal rating as have been specified in clause No. 3.5 at all transformation ratio. Magnetization curves corresponding to all secondary taps must be submitted with the tender.

The ratings of current transformers of all classes regarding ratio error, knee point voltage, resistance of secondary winding etc. shall have to be co-ordinated with the requirements of protective relays and protection scheme, without any extra cost.

3.7 Before commencement of supplies one No. panel with circuit breaker, VT etc. will have to be subjected to temperature rise test without extra charges in the presence of our Inspecting Officer.

3.8 The tenderer shall also furnish along with the tender, complete general arrangement, schematic and outline diagrams indicating the mounting arrangement and position of current transformers, voltage transformer terminal blocks etc. Type of current transformer and voltage transformer employed shall also be clearly stated.

3.9 INDICATING AND INTEGRATING METERS/INSTRUMENTS :

3.9.1 All indicating instruments shall be of switchboard type, back connected, suitable for flush mounting and provided with dust and vermin proof cases for tropical use and finished in suitable colour. All instruments shall have practical laboratory means for adjustment of accuracy. **Only analog type indicating instruments shall be acceptable.** The limits of errors for ammeters/voltmeters shall be those permissible for class 1.0 or better instruments as per IS:1248. The ammeters and voltmeters shall be suitably scaled to indicate the current/voltage for all the rating of current/voltage transformers. A phase selector switch with four/six position shall be used to measure the current/voltage of each phase/line. The meters shall be located at eye level to facilitate observation of readings correctly.

3.9.2 A.C. Static HT Trivector Meter :

3 phase 4 wire A.C. Static H.T. Trivector meter of accuracy class 0.5S for measurement of energy as per latest specification of JVVNL with DLMS protocol, shall be provided on each Outdoor VCB Kiosks.

Following makes of HT TVMs are acceptable:

i) Secure
ii) L&T
iii) ABB/Elster
iv) Schlumberger
v) Genus Infra
vi) HPL make.

Any other make being procured by Nigam shall also be acceptable.

3.10 RELAYS :

The circuit breaker shall be fitted with shunt trip coil for operation on Numerical Over Current and Earth Fault relay. The coils should be rated for 110VDC operation on station battery.

Three phase protection relays shall be Numerical Over-current & Earth Fault protection having 3 element for over current and one for earth fault protection with instant trip. The setting for over-current shall be 50-200% (continuous range) and for earth fault element from 5 to 80% (continuous range). These

relays shall be non directional with selectable curve for all standard IDMT curves. The numerical relays shall have following features:-

i. Self Diagnosis
ii. Minimum last five abnormal events recording (over current & earth fault) indicating fault current and phase, along with Date & Time.
iii. On-line display of current.
iv. Communicable with open Protocol having RS-485 port.
v. Instantaneous Over-Current Protection with adjustable timer.
vi. Breaker Failure detection.
vii. In-built Circuit Breaker Trip Circuit Supervision function during pre closing and post closing of Circuit Breaker.
viii. DC supervision.
ix. Very low burden on CT (less than 0.5VA)
x. Continuous monitoring of module's internal hardware and alarm generation in case of failure of any critical components.
xi. 5 Digital Output contacts for local alarm as well as tele-signalling.

The relay shall be numerical type mounted in flush pattern on the panel board. The relay should be rated for 5 Amp. CT secondary. The relay should conform to relevant ISS. The tenders shall furnish the detail in this regard along with the offer.

All the relays shall be provided with test blocks in panel so designed that the relays may be tested in situ. The relays should have provision of testing either through test block or test plug easily accessible by injecting the voltage / current/frequency (as applicable) from external testing instruments /source without first disconnecting/ reenergizing the primary electrical circuit protected by the relays. Facilities for isolating the tripping circuit during such testing shall also be provided.

Relay TTB shall have trip bypass arrangement.

The requirement of test block shall not be applicable in case of drawout type relays which can be tested by using test plug without removing the relay from its casing.

The testing facilities provided in the relays shall be specifically stated in the bid. One test plug with five panels or part thereof are to be supplied.

The Following makes of Relays are acceptable:-

a. Areva.
b. ABB.
c. Easun Reyrolle
d. C&S
e. Crompton
f. JVS
g. SEL
h. ASHIDA
i. MEGAWIN
j. Stelmec

The technical suitability of relays/schemes may also be examined by Protection Wing & acceptability will be judged appropriately.

The bidder must furnish type test reports as per relevant ISS/ IEC along with bid to suit the environmental conditions of our State, in respect of the relay (of the type and design offered) which should have been type tested in NABL accredited test laboratory in respect of such tests for which the lab has been accredited (for Indian make Relays)/ CPRI/ Nationally accredited testing laboratory (for Foreign make Relays). These type test reports should not be older than **five** years from the date of opening of bid. Bids without Type Test reports will be treated as Non-Responsive. **Any other equivalent make of relays shall also be acceptable subject to prior approval of S.E. (MM-II), JVVNL, Jaipur.**

3.11 WIRING :

All wiring shall be of switch board type consisting of copper conductor of 1.5 Sq. mm. for alarm / annunciation / control circuits and 2.5 Sq.mm. for CT and all other Circuits insulated with polyvinyl chloride insulation suitable for 660 Volt service and in accordance with relevant IS:732. Polyvinyl Chloride used shall have excellent resistance against burning, moisture, oil and vermin and shall be finished with clear colour. Rubber insulated wiring shall not be acceptable. Tenderers shall furnish the details of method being adopted by them for Joint/ Connections.

All instruments and Panel wiring shall be of heat resisting and self extinguishing type in compliance with IS. Plastic or porcelain cleats of the limited compression type shall be used for holding wiring runs. All wires shall be suitable for bending to meet the terminal studs at right angles. Metal cases of all apparatus mounted on panels shall be separately earthed by means of copper wire or strips. The following colour scheme of the wiring shall be used as per IS:375.

a) AC three phase circuits :

i) No.1 Phase : Red.
No.2 Phase : Yellow.
No.3 Phase : Blue

ii) Neutral Conductor : Black

iii) Connection to Earth : Green

b) D.C. circuits : Grey

3.12 MIMIC DIAGRAM :

For indoor panels painted colour bands shall be used for the mimic bus. The mimic diagram shall be on eye level. Equipments such as current transformers, voltage transformers etc. shall be represented by suitable symbols. The colour shall be Red Shade 537 of IS-5.

3.13 INDICATING LEDs:

Indicating LEDs shall be provided on the control board to indicate the following:

1. Visual indication of ON and OFF position of each circuit breaker.
2. Trip circuit healthy indication.
3. Auto trip indication for each circuit breaker panel.
4. VT supply indication.

Each lamp body shall be of moulded insulation and shall be able to withstand a high voltage test of appropriate value. All LEDs shall be suitable for 240 V AC supply and shall have low power consumption and shall provide a wide angle of illumination of sufficient intensity for comfortable viewing. A glass of appropriate colour shall be screwed into the front of the LED. The design of LED shall be such as to facilitate replacement of defective LEDs. An engraved label indicating the purpose of the LED shall be provided with each LED.

3.14 TEST TERMINAL BLOCKS :

Two nos. test terminal blocks shall be provided one for testing of relays and other for testing meters. They shall be of switch board, back connected type for front of panel mounting. The test blocks shall provide complete isolation of meters, instruments, etc. and the arrangement shall be such that testing power could be connected at the test block from any external source or may be taken from the instrument transformers. Provision shall be made for short circuiting current transformers. Suitable sealing arrangement shall be provided in test terminal blocks.

3.15 FERRULES :

Ferrules engraved/printed with the same number, letters or symbols as indicated in the connection and wiring diagram shall be provided on the terminal ends of all wires for identification of circuits for inspection and maintenance. Ferrules shall be of strong and flexible insulating material with glossy finish to prevent adhesion. They shall be engraved / printed and clearly marked and shall not be effected by dampness. Ferrule numbering shall be in accordance with IS:375. The same ferrule number shall not be used on wires in different circuits on a panel.

3.16 SPACE FOR CABLES AND CABLE GLANDS :

Sufficient space for receiving the cables inside the switch board at the bottom of the cubicles and mounting arrangement for the terminal cable glands shall be provided. Cable gland plates should be above the ground level for the ease of working.

3.17 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 powder 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.

3.18 SCHEDULE OF REQUIREMENTS :

The requirement of circuit breakers shall be as per Clause No. 3.31. At a particular sub station one or two transformers can be controlled through one breaker depending upon the necessity. Each of these breakers shall be equipped as per clause No. 3.19.

3.19 SCHEDULE OF EQUIPMENT :

Item No. 1 (TRANSFORMER TYPE)

36KV/800 Amp. VCB Switchgear panel for indoor installation:

1. 36KV/800A Vacuum Circuit Breaker drawout type with provisions of manual tripping by means of a control switch/push button.	1 No.
2. Motor Charged Spring operated closing mechanism.	1 No.
3. Numerical 3 0/C + E/F relay	1 No.
4. Single phase 36 KV current transformers of ratio 400-200/5-5A suitable for metering and protection. The class of accuracy shall be 0.5 S for metering and 5P15 for protection. Rated burden (output) shall be 30 VA for protection & 15 VA for metering for each secondary core. Instrument security factor for metering core shall not exceed 5.	3 Nos.
5. Flush type switchboard mounting pattern Analog voltmeter of class 1.0 or better accuracy suitable for 110 V phase to phase secondary scaled for 0-40 KV.	1 No.
6. Voltmeter phase selector switch to indicate phase to phase and phase to neutral	1 No.

voltage of all the three phases.

7. Indicating LEDs coloured red, amber and blue for PT supply indication. — 3 Nos.

8. Arrangement for reception of incoming and outgoing cable connection along with cable termination and sealing kits for **3 C x 400 mm** sq. XLPE power cables. — 2 Nos.

9. Set of three phase air insulated main electrolytic copper bus bars of 800 A continuous current rating having maximum current density 1.5 Amp./ Sq. & minimum cross sectional area 720mm Sq. with PVC insulation or sleeves. STC rating 25 KA for 3 seconds. — 1 No.

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 bus supports and bushings shall be non hygroscopic non aging glass reinforced polymer.

10. Mechanical ON/OFF indicator. — 1 No.

11. Operating handle for independent manual — 1 No.

closing mechanism.

12. Red indicating LED for ON indication.	1 No.
13. Green indicating LED for OFF indication.	1 No.
14. Auxiliary switch having minimum of 8 contacts 8 normally open and 8 normally closed.	1 No.
15. Flush mounting pattern analog ammeter of class 1.0 accuracy or better for 5 Amps. CT secondary scale 0-200/400 A.	1 No.
16. Ammeter selector switch to indicate phase current in all three phases and with OFF position.	1 No.
17. AC HT Tri vector meter	1 No.
18. Auxiliary Relay type VAA 33 or equivalent For transformer protection functions.	2 Nos.
19. Trip Circuit Supervision Relay	1 No.
20. D.C. Supervision Relay	1 No.
21. Annunciator 16 window	1 No.
22. High Speed Trip Relay	1 No.
23. Semaphore indicators	As per requirement
24. Three Position control switch for circuit Breaker & Annunciation window	1 No.
26. Automatic door CFL with Switch.	1 No.
27. 240V, 80W AC single phase anti condensation heaters with thermostat (0-60 eg. C) and switch.	2 Nos.
28. Anti pumping contactor.	1 No.
29. Operation Counter.	1 No.
30. Test terminal blocks for metering and relays, 3 phase 4 wire.	2 Nos.
31. Fault trip yellow LED.	1 No.
32. Ground bus system, size 50x6mm copper	1 No.

may be provided and the earthing stud shall be capable of withstanding rated short circuit current and stud design shall be as per IS-133427 or IEC -200.

33. Bell for Alarm 1 No.

34. Hooter for Alarm 1 No.

35. 3 Pin Socket with switch 1 No.

36. 2 Pin Socket with switch 1 No.

37. Auto Trip Lamp 1 No.

Item No. 2 (FEEDER TYPE)

36KV/800 Amp. VCB Switchgear panel for indoor installation:

1. 36KV/800A Vacuum Circuit Breaker drawout type with provisions of manual tripping by means of a control switch/push button. 1 No.

2. Motor Charged Spring operated closing mechanism. 1 No.

3. Numerical 3 0/C + E/F relay 1 No.

4. Single phase 36 KV current transformers of ratio 400-200/5-5A suitable for metering and protection. The class of accuracy shall be 0.5 S for metering and 5P15 for protection. Rated burden (output) shall be 30 VA for protection & 15 VA for metering for each secondary core. Instrument security factor for metering core shall not exceed 5. 3 Nos.

5. 33000/110 Volts three single phase voltage transformers having 30 VA/phase burden and class of accuracy 0.5. The transformer shall be star-star connected. 1 Set

6. Flush type switchboard mounting pattern Analog voltmeter of class 1.0 or better accuracy suitable for 110 V phase to phase secondary scaled for 0-40 KV. 1 No.

7. Voltmeter phase selector switch to 1 No.

indicate phase to phase and phase to neutral voltage of all the three phases.

8. Indicating LEDs coloured red, amber and blue for PT supply indication. — 3 Nos.

9. Arrangement for reception of incoming and outgoing cable connection along with cable termination and sealing kits for 3 C x 400 mm sq. XLPE power cables. — 2 Nos.

10. Set of three phase air insulated main electrolytic copper bus bars of 800 A continuous current rating having maximum current density 1.5 Amp./ Sq. & minimum cross sectional area 720mm Sq. with PVC insulation or sleeves. STC rating 25 KA for 3 seconds. — 1 No.

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 bus supports and bushings shall be non hygroscopic non aging glass reinforced polymer.

11. Mechanical ON/OFF indicator. — 1 No.

12. Operating handle for independent manual closing mechanism.	1 No.
13. Red indicating LED for ON indication.	1 No.
14. Green indicating LED for OFF indication.	1 No.
15. Auxiliary switch having minimum of 8 contacts 8 normally open and 8 normally closed.	1 No.
16. Trip Circuit Supervision Relay	1 No.
17. D.C. Supervision Relay	1 No.
18. Annunciator 8 window	1 No.
19. High Speed Trip Relay	1 No.
20. Semaphore indicators requirement	As per
21. Three Position control switch for circuit Breaker & Annunciation window	1 No.
22. Flush mounting pattern Analog ammeter of class 1.0 accuracy or better for 5 Amps. CT secondary scale 0-200/400 A.	1 No.
23. Ammeter selector switch to indicate phase current in all three phases and with OFF position.	1 No.
24. AC HT Tri vector meter	1 No.
25. Automatic door CFL with Switch.	1 No.
26. 240V, 80W AC single phase anti condensation heaters with thermostat (0-60 Deg. C) and switch.	2 Nos.
27. Anti pumping contactor.	1 No.
28. Operation Counter.	1 No.
29. Test terminal blocks for metering and relays, 3 phase 4 wire.	2 Nos.
30. Fault trip yellow LED.	1 No.
31. Ground bus system, size 50x6mm copper	1 No.

may be provided and the earthing stud shall be capable of withstanding rated short circuit current and stud design shall be as per IS-133427 or IEC -200.

32. Bell for Alarm	1 No.
33. Hooter for Alarm	1 No.
34. 3 Pin Socket with switch	1 No.
35. 2 Pin Socket with switch	1 No.
36. Auto Trip Lamp	1 No.

3.20 All equipments shall be complete in all respect. All fittings, accessories or apparatus which may not have been mentioned above but which are usual/necessary for the equipments shall be included for each circuit breaker panel.

3.21 OPERATING AND MAINTENANCE INSTRUCTIONS :

The successful tenderers, on receipt of order shall arrange to despatch immediately 20 sets of the erection/operating and maintenance instruction manuals alongwith the requisite drawings of the equipments covered by this specification to this office for approval. Two sets of these, one set in English and one in Hindi will also be forwarded to the consignee alongwith each equipment.

3.22 TEMPERATURE RISE :

The maximum temperature rise of various parts of the circuit breakers when tested under rated conditions shall not exceed the specified values at a peak ambient temperature of 50 deg. c. The breakers may be provided with silver plated contacts if necessary to meet the requirement of IS:13118 where higher temperature rise is permitted with silver plating contacts. The quantity of silver facing shall be such that after carrying out one tenth of the total number of operations specified for the mechanical endurance test, there is still continuous layer of silver on the contacts. The temperature rise of CTs and PTs shall also not exceed the permissible values as per relevant Indian Standards when corrected for max. ambient temperature at site.

3.23 NAME/RATING PLATE :

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

Name & Address of Supplier	:
Telephone No.	:
Fax No.	:

Date of Despatch	:
Date of Expiry of Warranty	:
Name of Purchaser	:
TN No.	:

It will be mandatory for the supplier to punch TN No., Sr. No. & Make on two positions of the circuit breaker panel.

3.24 INSPECTION AND TESTING :

3.24.1 Each equipment shall comply with and shall be subjected to all routine and acceptance tests prescribed in the relevant Indian Standard Specification/IEC.

3.24.2 TEST OF 36KV INDOOR CIRCUIT BREAKER :

i) ROUTINE/ACCEPTANCE TESTS:

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 insulation resistance of main circuit.
d) Mechanical operation test.
e) Design and visual checks.
f) Any other tests not specified above but covered as per amendment/ latest edition of relevant IS/IEC.

ii) Inspection & tests on control gear :

In addition to the above tests at 3.23.2(i) above specified by IEC, the following shall also be performed at manufacturer's works in the presence of purchaser's representative after completely assembling the kiosk.

a) Checking wiring of circuits and their contacts.
b) Insulation resistance of complete wiring, circuit by circuit with all equipment mounted on the panels.
c) Checking and operational protective schedule and instruments meters.
d) Checking of phase faults between R&Y, Y&B and B&R phases. Breaker should trip under all three conditions.

iii) Temperature Rise test on One No. Breaker in the first offered lot shall also be done in the presence of the purchaser's representative.

iv) TYPE TESTS CONDUCTED ON MATERIAL AS PER RELEVANT STANDARDS :

a) Dielectric tests.

i) Lightning Impulse Voltage Test.
ii) One Minute Power Frequency Test (Dry).

b) Short time with stand current and peak withstand current test.
c) Basic short circuit duties test.
d) Single phase short circuit test.
e) Mechanical Operation Test as per M-2 class.
f) Out of phase making & breaking test.
g) Capacitive Current Switching Test.
   i) Cable Charging Test.
   ii) Single Capacitor Bank Current Switching Test.
h) Measurement of insulation resistance of main circuit.
i) Temperature rise test.
j) IP-5X test (for cubicle/control cabinet).
k) Any other type tests not specified above but covered as per amendment / latest edition of relevant IS/IEC

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 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 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 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**."

3.24.3 The type test reports of Circuit Breakers, Current Transformers, Potential Transformers, Relays, meters etc. shall be complete in all respect along with oscillographic records, photographs etc. in respect of all type tests as per relevant ISS/IEC.

The type test certificates should be in respect of specific make and type / rating of the Circuit Breakers/ instruments, transformers etc. intended to be supplied and not in respect of the breakers etc. manufactured by their foreign collaborators if any.

Any bidder having experience for supply of any type of 33 KV & above rating of breakers will be eligible for quoting in this tender.

Necessary data with test reports to show capability of circuit breaker to withstand number of full level short circuit faults be also furnished. Complete literature must be sent with the tender.

3.24.4 Routine & acceptance test as per relevant standard shall be carried out on each equipment covered by this specification in the presence of purchaser's representative. If so desired by the purchaser all test reports shall be submitted and got approved from the purchaser before despatch of the equipment. Before commencement of supplies one panel complete with Circuit Breaker, VT etc. will be subjected to temperature rise test in the presence of our Inspecting Officer.

3.24.5 INSPECTION AND TESTS OF CONTROL GEAR :

All the tests (as mentioned at Clause 3.23.2(i)) 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 furnishing 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.

3.25 TECHNICAL PARTICULARS :

3.25.1 The tenderers shall furnish the guaranteed technical & other particulars of the equipments offered in the proforma appended at Schedule-V. Tenders not accompanied with such details are liable to be ignored.

Make of various equipments should be clearly stated. Words like reputed, equivalent etc. shall not be accepted. Alternative makes of equipments should not be more than two in the order of preference.

3.25.2 INTER CHANGEABILITY :

All similar materials and removable parts of similar equipments shall be inter changeable with each other.

3.26 OPTIONAL SPARES:

The tenderer shall furnish list of recommended optional spares that will be required for breakers alongwith their total and unit prices.

3.27 TITLE PLATES:

A Title plate bearing the name & purpose of each panel shall be fixed on the top of each indoor panel.

3.28 FAULT / TROUBLE ALARM SCHEME :

The automatic trip of the Circuit Breaker due to operation of protection relays shall be indicated by sounding of a hooter. All non-trip alarms shall be indicated by an alarm bell.

3.29 PERFORMANCE WARRANTY PERIOD :

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

The amount of performance security shall be **five percent** of the amount of supply order in case of procurement of goods and services. In case of Small Scale Industries of Rajasthan it shall be **one percent** of the amount of quantity ordered for supply of goods and in case of sick industries, other than Small Scale Industries, whose cases are pending before the Board of Industrial and Financial Reconstruction (BIFR), it shall be **two percent** of the amount of supply order, 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 **E-mail/ FAX 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 the breaker. This penalty will be in addition to the penalty leviable delay in delivery mentioned in purchase order.

In case firm fails to attend the complaint within 120 days from the date of intimation, the cost of the VCB shall be withheld from firm's financial hold.

Further to this, in case of emergency, breaker can be get rectified by the sub-divisional officers/ M&P officers (as authorized by Nigam) at the risk & cost of the supplier firm, by obtaining quotation from three firms, for same item/equipment, meeting the general requirement of specification. The rectification of breaker means satisfactory performance report duly signed by the sub-divisional officers/ M&P officers (as authorized by Nigam) i.e. in-charge of 33/11 KV Sub-Station.

3.30 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.

3.31 QUANTITY: **36 KV INDOOR VACUUM CIRCUIT BREAKERS = 50 Nos.**

a) Transformer Type 17 Nos.
b) Feeder Type 33 Nos.

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

3.32 MAKE AND TYPE OF BOUGHT OUT ITEMS :

3.32.1 The following make of bought out items will be acceptable to department :

S.No.	Name of Item	Make
1.	Indicating Instrument (Analog type)	AE/IMP/MECO/RISHABH
2.	Indicating Instrument (Digital type)	AE/IMP/MECO/RISHABH
3.	Control Switch for Circuit Breaker/Trip Transfer.	ALSTOM/RECOM/SWITRON/ KAYCEE
4.	Selector Switch for Voltmeter/Ammeter	SWITRON/KAYCEE/RECOM
5.	Semaphore Indicator	ALSTOM/DAV IND./ER
6.	Indicating Lamp	ALSTOM/TEKNIC/ VAISHNO/DAV
7.	Annaunciator	MINILEC/YESHMUN/ INSTALRAM/PROTON/ JVS/PRADEEP/ALAN
8.	Push Button	TEKNIC/VAISHNO/ESSEN
9.	A.C. Hooter/Bell	TARGET/INDUSTRIAL HOOTER/ALAN/JVS
10.	D.C. Hooter	TARGET/INDUSTRIAL HOOTER/ALAN/JVS

11.	Heater	SOFIA/ELTER/AIREX/KAYCEE
12.	Link Type test terminal block for testing of TVM	IMP/CAPITAL
13.	CFL Tube	PHILIPS/CROMPTON/BAJAJ
14.	2 Pin/3 Pin socket with Switch (5/15A)	ISI MARK
15.	Relays	Areva/ABB/Easun Reyrolle/ C&S JVS/SEL/ASHIDA/MEGAWIN
16.	HT TVM	Secure/L&T/ABB/Elster/Schlumberger

Other makes shall also acceptable if it is of "ISI MARK" or type tested for which tenderers shall furnish attested photo state copies of ISI Certificate/type test report not older than 5 years for the respective make offered with the prior approval of SE(MM) JVVNL, Jaipur.

3.32.2 Make / type of each relay, indicating instruments, integrating instruments, control switches, selector switches, indicating lamps, semaphore indicators, enunciator scheme, bell, hooter etc. shall be clearly and invariably indicated in the GTP (Guaranteed Technical Particulars), bill of material and unit price list. Only specific make accessories shall be indicated. The word "EQUIVALENT/REPUTED MAKE" will not be given for consideration.

3.33 BILL OF MATERIAL :

The firm shall furnish the bill of material for Indoor VCB Panel separately.

3.34 PAYMENT:-

100 % (Hundred percent) payment of each consignment shall be made along with taxes & duties by the concerned Sr. Accounts Officer/ Accounts Officer (CPC), subject to furnishing of **Bid Security** in terms of relevant clause of GCC and Bank Guarantee of 10% cost of breaker towards satisfactory installation & commissioning of breaker. The Bank Guarantee of 10% cost of breaker shall be released on production of satisfactory Installation & Commissioning certificates from the Nodal Officer and deposition of penalty towards delay in Installation & Commissioning of Breaker.

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.

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/ BG of 10% cost of breaker, may be released.

3.35 Desirable Features Required for Safety and Smooth functioning of the Circuit Breaker:

As these breakers are to be installed inside the control room therefore the features related with the operators safety is of the paramount importance.

A) Vacuum Circuit Breaker :

i) The VCB shall be totally drawn out type with racking gears with distinct test & service positions. The contact wipe shall be independent of the manual intervention.
ii) The movement of VCB shall be duly interlocked so that it can not be racked in to service position in pre closed condition & it is not possible to rack out from service position in pre closed condition. Any attempt to close the VCB into intermediate position shall be blocked by sustained mechanical tripped command overriding on to the mechanism to avoid closure of the contacts of VCB. Any attempt to cause the movement of VCB shall initiate the tripping of a VCB and only thereafter the movement shall be facilitated.
iii) The mechanism shall be trip free type with inherent capability of O-CO operation.
iv) The Auxiliary switch shall be 8 N/O + 8 NC contacts.
v) keeping in view on unmanned substation and grid complexity, the rated operating sequence shall be of rapid auto-reclosing duty as O-0.3sec-CO-3min-CO.
vi) In view of frequent operations encountered in the distribution system, it is highly beneficial to Nigam to opt for M2 Class mechanism (suitable for 10000 mechanical endurance operations as per latest IEC-62271-100) as against M1 Class mechanism (suitable for 2000 mechanical endurance operations) which will give long trouble free performance, thus saving huge life cycle costs in terms of maintenance and man power cost.
vii) The Circuit Breaker should be design in such a manner that there should be proper metal compartmentalization of the various circuit breaker parts such as breaker chamber, Bus bar chamber & Cable chamber.
viii) Test and service position limit switches shall be provided.
ix) The provision is made to avoid accidental contact & access to the high electrically stressed area by providing appropriate touch to safe metal screens when the VCB is posed into service position inside the cubical.
x) No separate VCB handling trolley shall be required to insert the VCB inside the panel. The VCB shall be floor rolling type.
xi) The VCB is provided with proper interlock for the secondary isolating plug & socket type contacts so that it is not possible to insert the VCB from the test to service position unless the secondary plug socket is connected & it is not possible to remove the secondary plug socket into intermediate position & in service position. This interlock as per IEC 60298 is an inherent part of the VCB & panel design.
xii) The vacuum interrupter is housed into epoxy pole unit to have better environmental protection & safe operation under the fatal conditions. The bellow for the VI shall be of stainless steel.
xiii) The insulation used shall be non hygroscopic & non deformable type and it is free from any partial discharges when exposed to sustain over voltages.
xiv) The VCB shall be completely type tested as IEC 62271-100/200 or ISS
xv) The VCB shall be Tested for E2, M2, C2 test duties.

1. B) VCB Panel features :

xvi) The panel shall be totally dust and vermin proof & has degree of protection – IP5X.

xvii) The operating instruments like switches etc shall be placed at height less than 1900mm.

xviii) The total height of the panel should not exceed more than 2700mm and width 1200mm.

xix) The panel is designed totally on air clearances basis with no dependency on the external shrouds & add on insulations.

xx) The panel shall have epoxy spout insulators between the bus bar & VCB chamber to have proper compartmentalization.

xxi) The bus risers shall be epoxy coated and is integral part of the spout bushings.

xxii) Entire bus bar compartment is provided with solid insulation scheme to have less dependency on the inter phase barriers.

xxiii) The panel shall have rigid sheet steel construction for better stability and shall be self standing without the external bracings. The sheet thickness should not less than 3mm.

xxiv) The panel is designed to have gravity operated self resetting type pressure relief flaps to have internal arc fault proof design.

xxv) The panel is having integral foundation frame.

xxvi) The CT's shall be top terminal CT's and mounted on the panel base frame to facilitate easy mounting and sevicibilty.

xxvii) Adequate cable termination space of around 700mm shall be provided with facility to terminate 3 cables of 3CX400 sq. mm size.

xxviii) Panel is provided with independently operating insulated type non metallic shutters with pad locking facility. The shutters shall automatically operate with the VCB trolley movement.

xxix) The panel shall be provided with draw out type of 3 No. single phase PT's.

xxx) The multi-core cable entry can be provided optimally from front or rear side of the panel. Cable entry from LH/RH side through self standing side cable boxes.

Desirable Features for Relay :

xii. Numerical 3 over current and Earth fault relay with instant trip.

xiii. Instantaneous Over-Current Protection with adjustable timer.

xiv. Breaker Failure detection.

xv. In-built CB Trip Circuit Supervision function during pre closing and post closing of CB.

xvi. DC supervision.

xvii. Disturbance Recorder. Up 1 sec of actual waveform of current along with logical and physical status, are captured & saved in the built-in memory with date time stamping, for analyzing fault condition & fault location.

xviii. Fully communicable with IEC standard open protocol.

xix. Separate Communication Port for SCADA (RS485) as well as Local testing (RS232C)

xx. Very low burden on CT (less than 0.5VA)

xxi. Continuous monitoring of module's internal hardware and alarm generation in case of failure of any critical components.

xxii. Facility to synchronized Relay time from SCADA

xxiii. 5 Digital Output contacts for local alarm as well as tele-signalling

3.36 PROTO TYPE SAMPLE:-

One Proto Type 36 KV Indoor 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 and successful bidder will have to complete the entire ordered quantity within **three** 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.

3.37 ADDITIONAL ORDER

Repeat orders for additional quantities, upto 50% of original ordered quantities, may be placed by the Nigam, on the same rates, terms and conditions given in the contract.

3.38 QUALITY ASSURANCE PLAN

1) The Bidder shall invariably furnish following information along with his offer, failing which the 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 material are tested, list of tests normally carried out on raw material in the presence of Supplier's representative, copies of test certificates.

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

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) The bidder should have adequate facilities to carryout accurately all required tests during manufacturing and routine/acceptance tests as per relevant ISS/IEC standards at the final end routine/acceptance. The supplier will ensure that all testing/measuring instruments/apparatus are calibrated at regular periodicity from reputed test house as per relevant standards and a certificate of testing authority is made available to purchaser's inspector at the time of inspection. Such calibration certificates, in any case shall not be older than one year on the date of such tests".

viii) List of testing instruments and apparatus along with their last date of calibration, available with the Bidder for testing of equipment specified and test plant limitation, if any, vis-a-vis the type, special, acceptance and routine tests testing during manufacture specified in the relevant standards. These limitations shall be very clearly brought out in "Schedule of Deviations".

2) The Supplier shall also submit the following information to the Purchaser, along with drawings/GTPs/BOM of ordered material, within 15 days of placement of order for purchaser's approval:-

i) Name of the raw material as well as bought out accessories and the names of sub-suppliers selected from those furnished along with the offer.

ii) Type test certificates of the raw material and bought out accessories/items.

iii) Quality Assurance Plan (QAP) withhold points for Purchaser's inspection. The QAP and Purchaser's hold points shall be discussed between the Purchaser and the Supplier before the QAP is finalized.

3) The Supplier shall submit the routine test certificates of bought out items and raw material at the time of routine testing of the fully assembled equipment.

3.39 Purchasing on the Risk & cost of supplier, in case of non-execution of order/delay in delivery.

As per field requirement, as it is, material (s) / equipment (s) is /are urgently required to Nigam and for which final notice has been given to supplier but supplier is being breach of agreement against stipulated delivery schedule, if at any time during the currency of the contract, the performance in whole or in part be prevented or delayed by more than the three months of the delivery schedule, the purchaser reserves the right to procure the material/equipment on order or part thereof from any other source at the risk and cost of the contractor/ supplier.

SCHEDULE-III (PART-B)

1 SCOPE

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

2.0 INSTALLATION & COMMISSIONING OF BREAKER

The 36 KV Indoor Type 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/ after receipt of material in stores.

3.0 ACTIVITY

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

a) Foundation of Bolts along with grouting.
b) Installation & Commissioning of Breaker.
c) Laying & connecting of 33 KV Cable from Transformer/ main bus bar to indoor breaker (33 KV Power cables shall be supplied by the Nigam)
d) Connection of Earthing of breaker from the earth mesh of the GSS)
All the petty items like nut, bolt, washers, gasket, etc. required during installation & commissioning shall be in the scope of installation & commissioning.

4.0 CIVIL FOUNDATION WORK:-

The foundation work for installation of 36 KV Indoor Vacuum Circuit Breaker will not involve any civil work, however, grouting of foundation bolts will be in the scope of supply.

5.0 INSTALLATION & COMMISSIONING OF KIOSK

Installation & commissioning of 36 KV Indoor Type 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.

The agency should engage team of experienced Engineers & skilled staff for the purpose of Installation & Commissioning of 36 KV Indoor Type 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 the Nodal officer for supervision of installation & commissioning of 36 KV Indoor Type Vacuum Circuit Breaker.

7.0 WORK COMPLETION SCHEDULE

The Installation & Commissioning of 36 KV Indoor Type 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. The concerned JVVNL officer shall give intimation to the firm only after transporting the breaker to Sub-Station.

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.

9.0 PAYMENT:-

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

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.

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 Indoor Type Vacuum Circuit Breaker and Installation & Commissioning charges inclusive of all type of taxes & service charges, if any.

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