

STANDARD TECHNICAL SPECIFICATION COVER SHEET

Specification No. : ENG-EHV-1020

Specification Name : Technical Specification for 33KV Outdoor Vacuum Circuit Breaker (1250 A)

Prepared by	Reviewed by	Reviewed by	Reviewed by	Approved by	Released by
SWARUP NAYAK	SURYAKANTA MOHANTY	SANTOSH KUMAR PATRA	Susavan Biswas	KHAJAN BHARDWAJ	POURUSH GARG
TPCODL	TPNODL	TPWODL	TPSODL	TPCODL	TPCODL
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Specification No: ENG-EHV-1020

Specification Name: Technical
Specification for 33KV Outdoor
Vacuum Circuit Breaker (1250 A)

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1. SCOPE:

This specification covers technical requirements of design, manufacture, construction, performance, testing at manufacturer's works, packing, forwarding, supply and unloading at stores/site of 33KV Outdoor VCB of 1250 Amps. completed with all accessories for trouble free and efficient performance.

2. APPLICABLE STANDARDS:

- a) IS 13118: Specification for High Voltage Alternating Current Circuit Breakers
- b) IS 12063: Classification of degrees of protection provided by enclosures of electrical equipment
- c) IS 2099: Bushings for alternating voltages above 1000 Volts
- d) IS 2629: Recommended Practice for Hot-Dip Galvanizing of Iron and Steel : Methods for testing uniformity of coating of zinc coated articles
- e) IS 2633: Hot Dip Zinc coatings on structural steel and other allied products
- f) IS 4759: High-voltage switchgear and control gear
- g) IEC 62271-100 Alternating current circuit breakers
- h) IEC 62271-1-: High-voltage switchgear and control gear - Part 1: Common specifications
- i) ISO 1460: Metallic coatings - Hot dip galvanized coatings on ferrous materials — Gravimetric determination of the mass per unit area
- j) BS 729 : Specification for Hot dip galvanized coatings on iron and steel articles

3. CLIMATIC CONDITIONS OF THE INSTALLATION:

1	Maximum ambient temperature	50 deg C
2	Max. Daily average ambient temp	35 deg C
3	Min Ambient Temperature	0 deg C
4	Maximum Humidity	100%
5	Average Annual Rainfall	150cm
6	Average No. of rainy days per annum	180 KMPH
7	Altitude above MSL not exceeding	1000m
8	Wind Pressure	180Km/hr
9	Earthquakes of an intensity in horizontal direction	equivalent to seismic acceleration of 0.3g
10	Earthquakes of an intensity in vertical direction	equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity)

TPCODL/TPNODL/TPWODL/TPSODL service area has **heavy saline conditions along the coast and High cyclonic Intensity winds with speed upto 180 Kmph.** The atmosphere is

generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months.

4. GENERAL TECHNICAL REQUIREMENTS

S. No.	Particulars	Requirements
		33 kV
4.1	Application	Outdoor
4.2	Type	VCB
4.3	Rated voltage	36 kV
4.4	Service voltage	33 kV
4.5	Rated Frequency	50 Hz
4.6	Number of phases	3
4.7	Rated insulation level	
4.7.1	Rated Lightning impulse withstand voltage	
a	To earth and b/w Poles	170 kVp
b	Across the isolating distance	195 kVp
4.7.2	Rated short duration power frequency withstand voltage	
a	To Earth and between Poles (Dry test for 1 Min)	70 kV
b	To Earth and between Poles and across the isolating distance (Wet test for 10 Sec)	75 kV
c	Across Open Switching Device	75 kV
4.8	Rated normal current	1250 A
4.9	Rated load breaking current (sym)	25 kA (rms)
4.1	Percentage DC component	<50 %
4.11	Rated short circuit withstand current for 3 seconds	25 kA (rms)
4.12	Rated short circuit making current	62.5 kA
4.13	First Pole to Clear factor	1.5 for Terminal fault
		1 for Short line fault
		2.5 for Out of phase fault
4.14	Rated capacitive switching currents	
4.14.1	Rated line charging breaking current	10 A (rms)
4.14.2	Rated cable charging breaking current	50 A (rms)
4.14.3	Rated single capacitor bank breaking current	400 A (rms)

4.14.4	Capacitor Banks with series reactors switching capacity	Suitable for 14.4 MVAR Capacitor Banks with series reactors
4.15	Maximum switching over voltages for cable charging & capacitor bank breaking current	2.5 p.u.
4.16	Rated operating sequence	0-0.3sec-CO-3min-CO
4.17	Total Break time(max)	65 ms (Shall not change during operating life)
4.18	Closing time (max)	85 ms (Shall not change during operating life)
4.19	Rated supply voltage of control circuits	48V/24V DC
4.19.1	Range for satisfactory operation of Trip circuit	70% to 110%
4.19.2	Range for satisfactory operation of closing & other circuits	85% to 110%
4.2	Transient recovery voltages	As per IEC 62271-100
4.21	No. of auxiliary contacts	10 NO & 10 NC
4.22	Clearance in air	
4.22.1	Between phases	420 mm
4.22.2	phase to earth	320 mm
4.23	Min. Creepage distance of insulator	31mm per kV
4.24	Degree of Protection	IP 55
4.25	Operating mechanism	Spring charged by universal motor.
4.26	Operation	Gang operated
4.27	Temp. rise at rated normal current	As per IEC 62271-100
4.28	Minimum Vertical clearance of live conductor from ground level	As per manufacturer's type tested design
4.29	Mechanical Endurance	M2
4.3	Electrical Endurance	E2 Class without Auto-Reclosing
4.31	Restriking Class	C2
4.32	Class	S2
4.33	Material of main contact	As per Manufacturer's Type Tested Design
4.34	Interrupter	Vacuum Interrupter should be of same make as that of Breaker manufacturer. Representative shall visit Interrupter manufacturing Facility during Factory Inspection.

4.35	Interrupting Capacity at nominal system voltage	1500 MVA
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Circuit Breaker shall be suitable for switching capacitor bank of rating 14.4 MVAR for 33 kV with capacitor bank star point undergrounded and series reactors (rating 6% of capacitor bank rating if connected on line side & 0.2 % if connected on neutral side of the capacitor bank rating). The circuit breakers should withstand capacitor bank inrush currents.

5. GENERAL CONSTRUCTIONS

5.1 GENERAL:

- 5.1.1 Control cabinets shall be of the dust, moisture, vermin proof and free standing floor mounting out door type. Control Cabinets shall be CRCA or better, surface treated for anti-oxidation/corrosion and power coated with epoxy highly suitable for outdoor installations (test reports shall be submitted).
- 5.1.2 Sheet steel shall be at least 2.5 mm thick. 15mm thick neoprene gaskets shall be provided to ensure degree of protection of IP 55.
- 5.1.3 Control cabinets shall be provided with hinged door and padlocking arrangement. The door hinges shall be of union joint type to facilitate easy removal.
- 5.1.4 Door shall be properly braced to prevent wobbling. Cable entry from bottom.
- 5.1.5 All wiring in the control cabinet shall be carried out with 1100V grade single core multi strand flexible copper conductor wires of size not less than 2.5sq.mm with HRPVC insulation and shall be flame retardant, vermin and rodent proof.
- 5.1.6 Suitable heaters shall be mounted in the housing to prevent condensation. On-off switch and fuse shall be provided. Heater shall be suitable for 240V single- phase 50 Hz AC supply. Electrical and Mechanical indications for ON-OFF to be provided which is visible from the front.
- 5.1.7 Terminal boards shall be furnished in the mechanism housing. All the terminal blocks shall be of disconnecting type links. Terminals for DC and AC shall be isolated from each other. A minimum of 20% spare terminals for control wiring shall be provided. All wiring in the housing shall be stranded and the insulation shall be vermin proof. Insulation shall be such that it shall not support combustion. Suitably rated switches shall be provided to enable the control supply to the breaker to be cut off from the mechanism housing. Requisite number of cable entries shall be provided at the bottom of the operating cabinet to receive purchaser's control cables. Number and size of cable glands will be intimated to the bidder. A light point with a control switch shall be provided inside the housing of the breaker.
- 5.1.8 Height of operating box of the CB shall be specified. The height of manual operating handle shall not be more than 1500mm from ground level. The operating box shall be provided with T-N-C switch "Pistol Grip" type for local operation. Separate terminal box below the main operating box to accommodate the terminal blocks shall be provided..

5.1.9 No external damping circuit shall be acceptable with the CB. Breaker tripping curve to be provided by the bidder. Bidders providing breakers with contact resistance <30 micro ohms and range for satisfactory operation of Trip circuit as 70 % to 110 % shall be given preference. The closing time and opening time shall not change during operating life. And the Contact resistance shall not change by $\pm 10\%$ during operating life.

5.1.10 Breaker shall be supplied with Two Tripping Circuit. Provision for Pre & Post Trip Circuit supervision is required in both circuits.

5.2 OPERATING MECHANISM:

5.2.1 Circuit breaker shall be power operated through a motor compressed spring charging mechanism. Spring operated mechanism shall be complete with motor, opening spring, closing spring and all necessary accessories to make the mechanism a complete operating unit. Spring_ charging motor shall be universal type with overload protection and overload relay with contacts for annunciation. Each mechanism shall be so designed as to enable a continuous sequence of circuit breaker opening and closing operations to be obtained by the control switch as long as power is available to the motor, and at least one circuit breaker opening and closing after failure of power supply to the motor. Also, the Circuit breaker shall have suitable provision for manual spring charging. Anti-pumping feature shall be provided.

5.2.2 Operating mechanism shall normally be operated by remote electrical control. Provision shall be made for local electrical control and a "local/remote" selector switch shall be provided in the operating mechanism cubicle. A conveniently located manual tripping lever or button shall also be provided for tripping the breaker and simultaneously opening the reclosing circuit. A manual closing device that can easily be operated by one person standing on the ground shall also be provided for maintenance purposes. Each circuit breaker unit shall be provided with operation counter.

5.2.3 A closing release shall operate correctly at all values of voltage between 70% and 110% of the rated voltage. A shunt trip shall operate correctly under all operating conditions of the circuit breaker up to the rated breaking capacity of the circuit breaker and at all values of supply voltage between 70% and 110% of rated voltage.

5.2.4 Working parts of the mechanism shall be of corrosion resisting material. Bearing which require greasing shall be equipped with pressure type grease fittings. Bearing pins, bolts, nuts and other parts shall be adequately pinned or locked to prevent loosening or changing adjustment with repeated operation of the breaker.

5.2.5 Main poles of each breaker shall be connected together and operated by a common mechanism and shall be so adjusted and arranged that interrupting contacts of all phases can be readily adjusted to touch and part simultaneously.

5.2.6 Provision shall be made to enable electrical & Castel Key interlocking with the opening or closing of the isolator when breaker is closed. All electrical and mechanical interlocks, which are necessary for safe and satisfactory operation, shall be furnished.

5.2.7 Floor clamps, Foundation bolts, Lifting hooks and one manually operated tank lifting & lowering device for frame-mounted tanks shall be provided. All similar parts, particularly removable ones shall be interchangeable with one another. Exposed live parts shall be placed high enough above ground to meet the statutory requirements and local safety codes. All Terminal blocks shall be stud type. Bidder shall give suitable

provision in CB such as space, auxiliary contact with wiring etc. for providing castle lock by purchaser.

5.3 CONTACTS:

Main contacts shall have sufficient area and contact pressure for carrying the rated current and the short time rated current of the breaker without excessive temperature rise that may cause pitting or welding. Contacts shall be adjustable to allow for wear, easily replaceable and shall have a minimum of movable parts and adjustments to accomplish these results. Main contacts shall be the first to open and the last to close.

5.4 BUSHINGS:

Porcelain used in bushing manufacture shall be a single piece and homogenous, free from laminations, cavities and other flaws or imperfections that might affect the mechanical or dielectric quality and shall be thoroughly vitrified, tough and impervious to moisture. Glazing of the porcelain shall be of uniform brown colour free from blisters, burns and similar other defects. Bushings shall be designed to have ample insulation, mechanical strength and rigidity for the conditions under which they will be used. All bushings of identical ratings shall be interchangeable. Insulation of bushings shall be coordinated with breaker insulation so that impulse flashovers will occur outside the tank. Puncture strength of bushings shall be greater than the dry flashover value. When operating at normal rated voltage there shall be no electric discharge between the conductors and bushing which would cause corrosion or injury to conductors, insulation or supports by the formation of substances produced by chemical action. No radio disturbance shall be caused by the bushings when operating at the normal rated voltage. Iron parts shall be preferably hot-dip galvanized, all joints shall be airtight. Surfaces of the joints shall be trued up; porcelain parts by grinding and metal parts by machining. Bushing design shall be such as to ensure a uniform compressive pressure on the joints.

5.5 PRIMARY TERMINALS:

Primary terminals shall be suitable for wedge type connectors with ZEBRA conductors. Successful bidder shall supply connectors. It should have Primary — terminals (connected at Fixed contact) on Single side at top in case of bypassing CB.

5.6 GALVANIZING:

All galvanizing shall be carried out by the hot dip process, in accordance with IS 2629/ ISO 1460 amended to date. However, high tensile steel nuts, bolts and spring washers shall be electro -galvanized to service condition four. The zinc coating shall be smooth, continuous and uniform. It shall be free from acid spots and shall not scale, blister or be removable by handling or packing. There shall be no impurities in the zinc or additives to the galvanic bath, which could have a detrimental effect on the durability of the zinc coating.

The minimum mass of Zinc coatings shall be as per IS 4759. After galvanizing no drilling or welding shall be performed_ on the galvanized parts of the equipment except that nuts may be threaded after galvanizing.

To avoid the formation of white rust, galvanized material shall be stacked during transport and stored in such a manner as to permit adequate ventilation. Sodium dichromate treatment shall be provided to avoid formation of white rust after hot dip galvanization. The galvanized steel shall be subjected to tests as per IS-2633/ BS 729 amended to date.

5.7 EARTHING:

Suitable grounding terminals shall be provided on the circuit breaker on opposite sides, for connecting to earth pit. The earthing terminals shall be readily accessible and so placed that the earth connection of the circuit breaker is maintained even when the cover or any other movable part is removed. GI strip for earthing shall be of size 50 mm X 6mm, approx. The earthing terminals shall be of adequate size, be protected against corrosion and shall be metallically clean. The earthing terminal shall be identified by means standard symbol marked in a legible and indelible manner on case or frame to be earthed adjacent to the terminals.

5.8 CT Mounting Arrangement:

CT Mounting Arrangement shall be in scope of supplier. Supplier has to provide the detailed calculation for selection of all Load Bearing Components . Components shall be GI.

CT Base shall be 450 X 450 mm (Hole Centre to Centre)
Minimum weight to be considered: 150kg per CT.

5.9 24V DC LED Type Indicating Lamps shall be mounted inside control cubicle which shall be visible from outside through glass of cubicle door.

- a. Breaker ON - Red
- b. Breaker OFF – Green
- c. Spring Charged - Blue

6. MARKING

Circuit breaker and its operating devices shall be provided with durable and legible nameplates containing all technical parameters. Name plate for Circuit breaker shall be embossed with "PO No. with date", "PROPERTY OF TPCODL/TPNODL/TPWODL/TPSODL", along with the following information:

Manufacture's name, Type designation and serial number

1. Year of manufacture
2. Relevant standard
3. Rated voltage
4. Rated lightning impulse withstand voltage
5. Rated switching impulse withstand voltage
6. Rated normal current
7. Rated duration of short circuit
8. Rated short circuit breaking current
9. DC time constant of the rated short circuit breaking current if different from 45 ms
10. DC component of the rated short circuit breaking current at contact separation corresponding to the dc time constant of the rated short circuit breaking current
11. Rated operating sequence
12. Classification

Name plate for the operating device shall be provided with following information:

1. Manufacturer's name
2. Type designation and serial number
3. Relevant standard

7. TESTS

All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. All routine/acceptance tests shall be witnessed by the Purchaser/his authorized representative. Following tests shall be necessarily conducted in addition to others specified in relevant standards.

7.1 Routine tests:

1. Dielectric tests on the main circuit
2. Tests on auxiliary and control circuits
3. Measurement of the resistance of the main circuit
4. Tightness tests
5. Design and Visual checks
6. Mechanical operating tests

7.2 Type tests:

1. Dielectric Tests
2. Measurement of the resistance of the main circuits
3. Temperature rise tests
4. Short time withstand current and peak withstand current tests
5. Additional tests on auxiliary and control circuits
6. Mechanical operation test at ambient temperature
7. Short circuit making and breaking tests
8. Verification of the degree of protection
9. Tightness tests
10. Mechanical tests
11. Out of phase making and breaking tests
12. Electrical endurance tests
13. Double earth fault tests
14. Capacitive Current switching tests

The above type test certificates must accompany drawing of type tested equipment, duly signed by type testing authority.

The above tests must not have been conducted on the equipment within time frame as per latest CEA Guidelines

In case of any change in design/type of Breaker already type tested and the one offered against this specification, the owner reserves the right to demand repetition of type tests, without any extra cost.

8. TYPE TEST CERTIFICATES

The Bidder shall furnish the type test certificates of the Item for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA/CESI/KEMA/KERI/PEHLA as per the relevant standards. Type tests should have been conducted in certified Test laboratories during the period not exceeding years as per CEA Guidelines from the date of opening the bid. In the event of any discrepancy in the test reports,

i.e. any test report not acceptable, same shall be carried out without any cost implication to TPCODL/TPNODL/TPWODL/TPSODL.

9. PRE DISPATCH INSPECTION

The Material shall be subject to inspection by a duly authorized representative of the TPCODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to TPCODL/TPNODL/TPWODL/TPSODL representatives at all times when the work is in progress. Inspection by the TPCODL/TPNODL/TPWODL/TPSODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCODL/TPNODL/TPWODL/TPSODL.

Following documents shall be sent along with material

- a) Test reports
- b) MDCC issued by TPCODL/TPNODL/TPWODL/TPSODL
- c) Invoice in duplicate
- d) Packing list
- e) Drawings & catalogue
- f) Guarantee / Warrantee card
- g) Delivery Challan
- h) Other Documents (as applicable).

10. INSPECTION AFTER RECEIPT AT STORES

The material received at TPCODL/TPNODL/TPWODL/TPSODL store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Project Engineering department.

11. GUARANTEE

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Company up to a period of 36 months from the date of commissioning or 48 months from the date of last supplies made under the contract, whichever is earlier, bidder shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the Company will be at liberty to get it replaced/rectified at bidder's risks and costs and recover all such expenses plus the Company's own charges(@ 20% of expenses incurred), from the bidder or from the " Security cum Performance Deposit" as the case may be.

The bidder shall further be responsible for "Free Replacement" for another period of THREE years from the end of the guarantee period for any "Latent Defects" if noticed and reported by the company.

12. PACKING:

Bidder shall ensure that all equipment covered by this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit.

13. TENDER SAMPLE : Not required

14. QUALITY CONTROL:

The bidder shall submit with the offer, assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction,

components during manufacture and after finishing, bought out items and fully assembled component and equipment including drives. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's/ Consultant's engineer shall have free access to the manufacturer/sub bidder's works to carry out inspections.

15. MINIMUM TESTING FACILITIES:

Bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards.

16. MANUFACTURING ACTIVITIES:

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.

17. SPARES, ACCESSORIES & TOOLS SPARES:

Following spares shall be supplied along-with CB. 10% spare to be considered. Bidder should quote unit rates for spares. Exact quantity to be finalized during tendering.

1. Trip Coil
2. Closing coil
3. Spring charging motor
4. Vacuum interrupter (For VCB type)
5. T-N-C Switch
6. Local / remote selector switch
7. LED Indicator (Red and Green)
8. Contactor/Relay for Control Circuit
9. Breaker aux contact

In addition to above bidder shall submit recommended list of spares for 3 years, if any with unit prices and recommended quantity.

ACCESSORIES: The circuit breakers shall be provided with the following accessories, in addition to those needed for normal operation and control

1. Breaker position indicator
2. Breaker Operation counter
3. T-N-C switch
4. A local mechanical emergency trip device with necessary shrouds
5. Castle key & Lock (Series will be finalized during detail engineering)
6. Electrical & Mechanical interlocks with isolators
7. A heater rated 230 volts AC, 50 Hz for the operating mechanism housing heater current monitors

SPECIAL TOOLS & GAUGES: A list of complete set of special tools and gauges required for erection & maintenance and installation procedure shall be submitted

18. DRAWINGS AND DOCUMENTS

Following documents shall be prepared based on TPCODL/TPNODL/TPWODL/TPSODL specifications and statutory requirements with complete BOM and shall be submitted with the bid:

- a) Completely filled in Technical Particulars.
- b) General description of the equipment and all components including brochures.

- c) Type test Certificates
- d) Experience List/Performance Certificates from end users.
- e) Foundation Plan
- f) Operation & Maintenance Manual

After the approval of the contract, four (4) copies of the drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval and shall subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy of all the drawing, GTP, test certificates shall be submitted after the final approval of the same to the purchaser

Following Drawings/Documents shall be submitted after the award of the contract

S. No	Description	For Approval	For Review Information	Final Submission
1	Technical Parameters	√		√
2	GA Drawings	√		√
3	Internal Wiring Diagram		√	√
4	Foundation Plan		√	√
5	Installation Instruction		√	√
6	Transport/Shipping dimension Drawing		√	√
7	QA & QC Plan	√	√	√
8	Test Certificate	√	√	√

All the Documents and Drawings shall be in English Language.

Instruction Manuals: Bidder shall furnish two (2) soft copies (CD) and four (4) hard copies of nicely bound manual (in English Language) covering erection and maintenance instructions and all relevant information pertaining to the main equipment as well as auxiliary devices.

19. GUARANTEED TECHNICAL PARTICULARS

S. No.	Description	Units	To Be Furnished by Bidder
			33 kV (VCB)
1	Application		
2	Type		
3	Rated voltage	kV	
4	Service voltage	kV	
5	Rated Frequency		
6	Number of phases		
7	Rated insulation level		
7.1	Rated Lightning impulse withstand voltage		
a	To earth and b/w Poles	kVp	
b	Across the isolating distance	kVp	
7.2	Rated short duration power frequency withstand voltage		

a	To earth and b/w Poles (dry test for 1 min)	kV	
b	Across the isolating distance(dry test for 1 min)	kV	
c	To earth and b/w Poles and across the isolating distance(wet test for 10 sec)	kV	
8	Rated normal current	A	
9	Rated load breaking current (sym)	kA (rms)	
10	Percentage DC component		
11	Rated short circuit withstand current for 3 seconds	kA	
12	Rated short circuit making current	kA	
13	First Pole to Clear factor		
14	Rated capacitive switching currents		
14.1	Rated line charging breaking current		
14.2	Rated cable charging breaking current	A	
14.3	Rated single capacitor bank breaking current	A	
14.4	Capacitor Banks with series reactors switching capacity	MVAR	
15	Maximum switching over voltages for cable charging & capacitor bank breaking current	p.u.	
16	Rated operating sequence		
17	Total Break time(max)	ms	
18	Total closing time	ms	
19	CO time	ms	
20	Pole discrepancy	ms	
21	Rated supply voltage of control circuits	V	
21.1	Range for satisfactory operation of Trip circuit		
21 2	Range for satisfactory operation of closing & other circuits		

20	Transient recovery voltages		
21	No. of auxiliary contacts		
22	Clearance in air		
22.1	Between phases	mm	
22.2	phase to earth	mm	
23	Min. Creepage distance of insulator	mm	
24	Degree of Protection		
25	Operating mechanism		
26	Anti pumping feature		
27	Spring charging time		
28	Temp. rise at rated normal current	Deg C	
29	Vertical clearance of live conductor	mm	
30	Mechanical Endurance		
31	Electrical Endurance		
32	Restriking Class		
33	Class		
34	Main Contacts		
34.1	Type		
34.2	Material		
35	Arcing Contacts		
35.1	Type		
35.2	Material		
36	No. of operations		
36.1	At rated normal current		
36.2	At rated capacitor bank breaking current		
36.3	At rated short circuit breaking current		
37	No. of breaks per phase		
38	Minimum contact resistance		
39	FOR VCB Type		
39.1	Type of indication for contact erosion		
39.2	Rating of interrupter		
39.3	Make of interrupter		
40	Connectors		
41	Type test certificates		
42	Test for Re-strike free for VCB		
43	Total weight of breaker (Kg)		
44	Dimensions (mm)		



Specification No: ENG-EHV-1020

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20. SCHEDULE OF DEVIATIONS

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

S. No	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above

Seal of the Company:

Signature

Designation

TPC[⚡]ODL
TPW[⚡]ODL

TPN[⚡]ODL
TPS[⚡]ODL

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21. SAMPLE DRAWING (For Tender purpose only)

