

SECTION – VII

TECHNICAL SPECIFICATIONS: 33 kV VCB

7.1 11 KV VACCUUM CIRCUIT BREAKER : PREFERRED MAKE : KIRLOSKAR ELECTRIC / BHEL / ALSTOM / CROMPTON GREAVES / AREVA.

7.1.1 SCOPE OF SUPPLY AND DESIGN CRITERIA

These specifications cover the design, manufacture, supply, erection, testing and commissioning of one number 11 kV circuit breaker vacuum type suitable for installation in out door switch yard. The breakers shall be complete in all respect including supporting structures, control kiosk mounted there on, bushings, terminal connectors suitable for ACSR conductor, operating mechanism, earthing terminals etc. as per relevant IS specifications. Scope of work also includes design, manufacture supplying, erection, testing and commissioning of indoor cubical type breaker control panel for remote operation of the breaker from control room with necessary protection relays, over current, earth fault reverse power relay, and any other relay required to make the system safe measuring and metering, indication equipments suitably housed along with the necessary accessories and properly wired. This control panel should be compatible in size and dimension with the LT control and relay panels for the generating units described in Section - VI

7.1.2 APPLICABLE STANDARDS

Unless otherwise modified in this specification, the vacuum circuit breakers shall comply with the following Indian Standards as amended from time to time:

IS - 13118 : Circuit breakers
IS - 3156 : Voltage transformers
IS - 2702 : Current transformers

7.1.3 METERING AND PROTECTION

- (i) Meters/instruments like KW meter, voltmeter, Ampere meter on the circuit breaker control panel shall be provided in accordance with the relevant ISI standards.

- (ii) A triple-pole IDMTL type protection relay having two elements for over-current protection and one element for earth fault protection shall be provided on 11 kV outgoing circuit breaker control panel. The current setting range of the over-current elements shall be from 50% to 200% in steps of 25% and that of the earth fault element from 20% to 80% in steps of 10%.
- (iii) Trivector electronic energy meter (microprocessor based , digital) on control panel for metering of energy on outgoing feeder.
- (iv) Provision of relays shall be kept in the panel for protection of transformers from high winding temperature, high oil level temperature and low oil level.

7.1.4 CONSTRUCTIONAL FEATURES – VACCUUM CIRCUIT BREAKER

Out door Application:

Vacuum circuit breakers for outdoor application shall be fixed type of construction and the vacuum interrupter units together with the HV connections shall be enclosed in a sealed housing (preferably of porcelain) conforming to IP-65 protection (IS:2147). The operating mechanism, links, etc. shall be housed in a suitable cubicle and should be accessible for maintenance. The indicators and operating handle etc. shall be provided on the front side with a hinged door and locking device. The door shall open upwards (with hinge at the top) for protection against rain (when in open position) .

No isolator shall be provided in outdoor breakers.

7.1.5 TECHNICAL PARTICULARS

i.	Nominal system voltage	:	33 kV
ii.	Highest system voltage	:	36 kV
iii.	BIL	:	170 kV
iv.	Power Frequency withstand voltage	:	70 kV
v.	Rated frequency	:	50 Hz
vi.	Rated continuous current	:	1250 A
vii.	Closing mechanism with	:	Electrical spring charging
			230 V AC motor and local manual closing.
	a. Closing coil/tripping coil (2 nos.)	:	48 V DC
	b. No. of Poles	:	3
viii.	Symmetrical short circuit withstand capacity	:	750 MVA for 1 sec.
ix.	Temperature rise	:	Not to exceed 50°C above ambient temp. of 45°C.
x.	Operating duty	:	0-3 min. CO-3 min.-CO.

xi.	Dead time of breaker	:	Adjustable between 0.3 sec. to 15 sec.
xii.	System neutral	:	Solidly Earthed
xiii.	Min. creeping distance	:	900 mm
xiv.	Control supply voltage	:	48 V DC
xv.	Auxiliary, contacts with each circuit breaker	:	6NO+6NC Interchangeable at site
xvi.	Accessories		
	a. ON/OFF/TRIP	:	Mechanical as well as Electrical
	b. Emergency tripping mechanism	:	Mechanical
	c. Termination suitable with connectors	:	ACSR Conductor
	d. Anti-pumping operation	:	To be provided
	e. Spring charge indicator	:	To be provided

7.1.6 OPERATING MECHANISM

- i. Electrically / Manually operated mechanism. Breaker shall be provided with trip free mechanism.
- ii. It shall be suitable for remote control from the control room.
- iii. The operating mechanism shall be of spring charging type by electrical control under normal conditions. The mechanism shall be trip free electrically and mechanically.
- iv. The motor for spring charging shall be suitable for operation on 230 V AC supply and shall have overload protection.
- v. A local control switch with locking arrangement shall be provided for each breaker for local operating i.e. tripping and closing during maintenance, test etc.
- vi. Local/remote selector switch and Trip/Normal/Close control switch shall be provided in the mechanism cabinet.
- vii. An operation counter for each breaker shall be provided.
- viii. Cabinet for operating mechanism and its accessories shall be as per relevant standards with padlocking facility. Cabinet shall be simplex type, all equipment mounted on front side and wiring on back in proper wire ways.
- ix. Panel illumination and anti-condensation heater shall be provided in the local and remote control panel with MCB and thermostat.
- x. Closing circuit to operate satisfactorily from 85% to 110% of the rated control voltage and tripping from 50% to 110% of the rated voltage.

7.1.7 TESTS

The circuit breakers, voltage transformers and current transformers shall be subjected to the following routine and type test in accordance with the details specified in the relevant Indian Standards, as amended from time to time.

Circuit Breaker - IS : 13118-1991

(i) Routine Tests

- ii) Power frequency voltage dry test on the main circuit
- iii) Voltage test on control and auxiliary circuits.
- iv) Measurement of resistance of the main circuit
- v) Mechanical operating test

(ii) Type Tests

- a) Tests to prove mechanical performance
- b) Tests to prove mechanical operation
- c) Tests to prove that temperature rise of any part does not exceed specified limits
- d) Tests to prove that insulation complies with specified limits
- e) Tests to prove short-circuit making and breaking performance.
- f) Tests to prove sort-time current performance.
- g) Tests to prove performance when breaking line charging current
- h) Test to prove performance when breaking cable charging current
- i) Tests to prove the performance when breaking single capacitor bank currents
- j) Tests to prove the performance when breaking small inductive currents.