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315kVA, Auxiliary Supply Power VT

Quantities

Four (4) pieces, three phase plus one spare.

Include connecting conductors, connector clamps and droppers.

Specifications.

Unless otherwise stated in the specifications, the switchgear shall comply with the following relevant IEC/IEEE standards among others. The latest version of the standards will be applicable as they are valid on the date of placing of the order.

- IEC 60044 Regarding instrument, voltage and Current Transformers.
- IEC 60076 Regarding Distribution/power transformers
- IEEE C57.13 regarding instrument transformers
- IEEE C57.12.00 Regarding Inductive Voltage Transformers
- IEC 60071 Insulation Coordination
- IEC 60060 High Voltage Test techniques
- IEC 62271-1 High Voltage Switchgear and Control gear,
- IEC 60376 Specifications of Technical grade sulphur Hexafluoride for use in equipment.
- CAN/CSA C60044-2 Regarding instrument, Voltage and \Current transformers

Normal Service Conditions.

S/no	Parameter	Unit	Value
1.	Insulation fluid	SF6 gas	SF6 Gas
2.	Installation type	Outdoor	Outdoor
3.	Altitude above sea level	Meters above sea level	1800
4.	Maximum ambient temperature	˚C	40
5.	Minimum ambient temperature	˚C	0
6.	Relative humidity (Max/Average)	%	94%/50%
7.	Solar Radiation	W/M^2	1,200
8.	Degree of Protection (IEC 60529)	Ingress protection	IP54
9.	Pollution Level (IEC 60815)	Heavy	31mm/kV
10.	Rated Power for one 3phase unit	kVA	315
11.	Isokeraunic level	Thunderstorm Days/year	120
12.	Earthing System	Solid ground	Solid
13.	Maximum wind Speed	m/s	8.7
14.	Average wind speed	m/s	25 at height of 60m
15.	Seismic condition	g	0.15g According to UBC-Universal Building code/USA (Zone classification is 2A)

Short Circuit Rating

S/no	Parameter	Unit	Value
1.	Rated Short Circuit Duration	s	3
2.	Rated Short time withstand current (Thermal short time current)	KA	31.5 rms
3.	Rated peak withstand current (Dynamic short time current)	kA	80
4.	Short circuit impedance	%Z	As per manufacturer's design.
5.	Winding Resistance	Ω	As per manufacturer's design.

Insulators

S/no	Parameter	Unit
1.	Insulator Material	Polymeric
2.	Insulator Colour	Grey
3.	Minimum nominal specific creepage distance	31mm/kV

SF6 Gas pressure (Relative Pressure) & Temperature Monitoring

S/no	Parameter	Unit	Value
1.	Annual SF6 leakage	% per annum	< 0.5
2.	Filling Pressure at 20˚C	As per manufacturer's design	
3.	SF6 gas alarm levels	As per manufacturer's design (Two alarm stages)	
4.	SF6 gas temperature alarm	Two alarm signals shall be envisaged (115˚C & 120˚C)	

Rated Insulation Level

S/no	Parameter	Unit	Value
1.	Rated Voltage between phases	kV	220
	Maximum voltage	KV	245
2.	Rated Frequency	Hz	50
3.	Rated Short time dry power frequency with- stand voltage	kV	460kV Internal *507kV external
4.	Rated Lighting impulse voltage 1.2/50µsec	kV	1050kV internal *1158kV external
5.	Rated Voltage factor	factor	1.2 cont. 1.5 for 30sec
6.	Rated Secondary Voltage	V	$\frac{415}{\sqrt{3}}$

- Air clearances are calculated based on an altitude of 1800m above mean sea level.
  *corrected insulation level

Scope

The scope of the power VT shall include but not limited to the following.

- Design,
- Procurement of equipment plus its associated circuitry, structures, control and power cables.
- Installation and erection,
- Testing and commissioning.
- Integration of the Power VT supply into the LVAC scheme including modification of the SCADA to incorporate the Power VT signals.
- Modification of the busbar protection schemes on which the bus the VT will be connected to and modify annunciation panel as will be applicable for the alarms as well as trips

The contractor shall review the space availability and firm up the installation location of the equipment i.e. bus bar 1 (HB1) or bus bar 2 (HB2).

The current LVAC scheme is designed with three incomers and once bus coupler with only two incomers connected i.e. 33/0.415kV, 315kVA TX, from the distribution system supply and a 500kVA, 415 (240)vac emergency diesel generator. A future incomer is envisaged through MCCB –Q2.

The modification shall ensure that the power VT supply is maintained as the prime source.

The integration of the power VT supply shall ensure no paralleling of the sources such that only two MCCBs (one incomer and bus coupler) are closed at any one time.

Alarms

Two alarm levels for SF6 gas shall be envisaged in the design. This shall include the gas lock out stage. The gas lock out state shall cause a trip all the CBs connected to the busbar on which the Power VT shall be connected.

Temperature alarms using a PT100 transducers and associated intermediate relaying shall also be envisaged in the design of the Power VT. Two SF6 temperature stages shall be considered i.e. 115˚C and 120˚C.The second stage (120˚C) shall be configured to initiate a trip to the LVAC incomer MCCB.

SAS signalling.

The four signals mentioned above shall be configured and mapped to the substation SCADA as well as transmitted to NCC/RCC.

Energy Meter

The Contractor shall install a dedicated three phase 415vac energy meter of class (0.2) and its associated panel for the tariff metring of the power VT supply. The energy metering panel shall be located in the auxiliary services room.

A dedicated yard marshalling kiosk filled with properly sized MCCB shall be installed at an appropriate location within the switchyard for the termination of the power and control cables

from the Power VT secondary terminal box. The MCCB shall have enough NO/NC contacts for annunciation of “POWER VT MCB TRIP” signal at station SCADA.

Civil Works

Include foundation (3no.) for Power VT in the price schedules, steel structures, anchor bolts and additional support structures.

The power cable and control cable laying methodology shall be subject to employer’s approval. The power & control cables shall be channelled through dedicated conduits/HDPE pipes and associated manholes located at appropriate locations from the yard marshalling kiosk to the Control building. For underground cables, shielded cables shall be installed and concrete blocks shall be used on above the cable before burying with soil, the concrete block to “HATARI” message written on them.The existing cable trenches shall not be used to route the power and control cables.

Update of existing Drawings/Documents

The responsibility of updating the available/existing primary and secondary drawings to include the Power VT lie with the Contractor.

These include but not limited to the following drawings:

- Simplified single line diagram.
- Detailed single line diagram.
- LVAC detailed single line diagram.
- LVAC auxiliary supply schematic diagrams.
- Signal List
- 220kV Diameter 1 Schematic diagrams.
- 220kV Diameter 2 Schematic diagrams.
- BUS BAR PROTECTION HB1/2 protection schemes.
- Location Plan.
- General Layout S01
- General Layout elevations 220_S02
- General Layout elevations 220_S03
- Electromechanical collection drawings.
- LVAC-DC cable list
- 220kV diameter 1 cable list.
- 220kV diameter 2 cable list.
- Station SCADA and NCC/RCC engineering database.
- Equipment layout inside control building.
- Equipment foundation layout and drawings.
- Substation drainage and cable trench/ducts.