

TPCTPNTPWTPS

Document No: ENG-GEN-052-R1

Document Title: Specification of vertical 11kV AB Switch (400A (3 Pole) and 200A (3 & 2 Pole))

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1. SCOPE

This specification covers the technical requirements of design, manufacture, test at manufacturer's works, packing & forwarding, supply and unloading at stores/ site, and performance of **11KV AB switch vertical** for trouble-free and efficient operation. The specific requirements are covered in the enclosed technical datasheet.

2. APPLICATION STANDARD

The items covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with latest revisions of relevant Indian Standards/ IEC/ International Standards and shall conform to the regulations of local statutory authorities.

Ref. IS	Description
IS 9920 (part-I to V)	Specification for helically formed fittings for Overhead lines up to 33kv
IS 2633 (Part 1)	Method for testing uniformity of coating on zinc coated
IEC 61109	Insulators for overhead lines - Composite suspension and tension insulators for a.c. systems with a nominal voltage greater than 1 000 V - Definitions, test methods and acceptance criteria
IEC 60168:1994+AMD1: 1997+AMD2:2000 CSV	Tests on indoor and outdoor post insulators of ceramic material or glass for systems with nominal voltages greater than 1000 V
IS 9530	Recommended practice for silver plating
IS 5925	Recommended practice for silver plating for general engineering purposes
BS 2816	Testing of silver-plating thickness
IS 1239	GI pipe ('B' class or Medium class)
IS: 5561	Electrical Power Connectors

*In case of any conflict on any technical particular in the specification, the stricter requirement mentioned in the relevant standard shall be valid.

3. CLIMATIC CONDITION

The material shall be suitable for following climatic conditions,

- Maximum Ambient Temperature 50 °C
- Maximum Daily Average Ambient Temperature 40 °C Minimum Ambient Temperature 2 °C
- Maximum Humidity 99.7 %
- Minimum Humidity 15 %
- Average Annual Rainfall 1800 mm
- Average Wind Speed prevailing in the area 200 km/hr.
- Average Thunderstorms prevailing in the area 70 days per annum Average dust storms prevailing in the area 20 days per annum
- Average number of rainy days per annum 160 Maximum Altitude above sea level 1200 m
- Seismic Level 0.24g to 0.48g

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

in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.3 g.

4. GENERAL TECHNICAL REQUIREMENT

GENERAL TECHNICAL REQUIREMENTS				
S/No	Description	Requirements		
1	Rating of Vertical AB Switch	400 Amp	200 Amp	200 Amp
2	Installation	Outdoor		
3	Type	3 Pole	3 Pole	2 Pole
4	Service Voltage	12 kV		
5	Rated Voltage	11 kV		
6	Rated Frequency	50 Hz		
7	Current Carrying Capacity	400 Amp	200 Amp	200 Amp
8	Rated short time current	16 kA for 1sec		
9	Rated peak withstands current	40 kA		
10	Rated main active load breaking capacity	10 Amp		
11	Rated off-loads breaking capacity	6.3 A		
12	Power Frequency withstand voltage between pole and earth	28kV		
13	Power frequency withstand voltage across the isolation distance	32kV		
14	No. of Post Per Phase	3		
15	Total No. of post (Polymer)	9	9	6
16	Minimum Creepage Distance	320 mm		
16.a	FRP Dia. of the Post Insulator (min.)	24mm		
16.b	Dai of Weather sheds	>100mm		
16.c	Thickness of Housing (min)	3mm		
16.d	Type of Sheds	Aerodynamic		
16.f	Manufacturing year of insulator	To be engraved on insulator		
16.g	PCD	57 mm		
17	Make of Insulator	Sun Kouture / Scenario / Prithvi Industries / Yamuna Power/ Jainco Transmission/ Navitas Insulators/ Deccan Electricals Complete type test reports of insulator to be provided during tender evaluation process. Year of manufacturing to be properly engraved on the Insulator.		
18	Phase to Phase Clearance	760 mm		
19	Isolation Distance	400 mm		
20	Size of flexible tinned copper braid tape (with 1A/mm ² current density)	400 sq.mm 35 X 5	200 sq.mm 25 X 5	200 sq.mm 25 X 5
21	Minimum length of insulated tinned copper Braid / rope per phase	550 mm		
22	Size of fixed contacts (with 1 A/mm ² current density)	400 sq. mm	200 sq. mm	200 sq. mm
23	Current density of tinned Copper	1 Amps/mm ²		

24	Size of rods used for arcing horns	10 mm		
25	Insulation for tinned Copper braid/rope	Polyolefin, (RSFR-H) type		
26	Minimum size*Length of Coupling GI Solid Rod (Operating square bar)	25X25X1800mm	For 3 pole – 25X25X1800mm	For 2 pole 25X25X1200mm
27	Minimum Thickness of GI Strip (Pentagraph)	20mmX3mm		
28	Temperature Rise Limit (w.r.t ambient temp)			
	- Tinned Copper contacts	65° C		
	- Terminals	65° C		
	- Metal Parts	40° C		
29	Fixed contact size (X2)	50 X 8 X 80 (x2)	35 X 6 X 70 (x2)	35 X 6 X 70 (x2)
30	Moving contact	50 X 8 X 200	35 X 6 X 200	35 X 6 X 200
31	Fixed & moving contact material	Electrolytic Copper Grade (Min 99.9% Cu) silver plating of 15 Microns thickness		
32	GI base channel	75X40X4.8 mm 650 mm long (Make- TATA/SAIL/JINDAL/ RINL)		
33	Fixed terminal	50 X 8 X 90 mm	35 X 6 X 80 mm	35 X 6 X 80 mm
34	Moving terminal	50 X 8 X 130 mm	35 X 6 X 130 mm	35 X 6 X 130 mm
35	Fixed & moving terminal material	Electrolytic Copper Grade (Min 99.9% Cu) silver plating of 15 Microns thickness		
36	Terminal Connector	One no. of bimetallic sockets shall be used at both ends suitable for 55-100 mm ² AAC conductor.		
		One no. of 12 mm dia. brass bolts, double nuts, plain washers & spring washers to be provided for socket.		
37	Operating down pipe	MS HDG 32 NB, 6-meter-without welding as per IS 1239 Class: Medium OD (max): 42.9 mm and (min): 42.0 mm Thickness: 3.2mm Tolerance: +/-10% on thickness Make: Jindal		
38	Locking arrangement (LOTO)	Provision for pad locking at both 'ON' & 'OFF' Position LOTO arrangement lock required		
39	Earth terminal	M10, MS(HDG)		
40	Marking/Engraving (Parameters should be embossed on Aluminum Sheet of thickness 0.4 mm with black background. It should be riveted on MS channel of AB switch) per each phase	1. Rated Voltage 2. Vertical 3. Manufacturer Name 4. Month/Year of Manufacture 4. Serial No. 5. PO No. 6. Rated Normal Current in Amps 7. Rated One Second Short-Time Current 8. Property of TPCODL/ TPNODL/ TPWODL/ TPSODL		
41	Arching horn size	10 mm GI		
42	Rocker assembly	MS (HDG)		
43	Eye hook	MS HDG (8 mm), 1 no's		
44	'I' bolt	2 Nos of 'I' Bolt for down operating pipe to be provided. Threaded portion shall be 75mm. M12 Dia, Double nuts for each 'I' bolt to be provided.		

45	Spring (SS) in fixed contact assembly (Per phase)	Total no of spring – 8	Total no of spring – 8	Total no of spring – 4
46	Copper foil in fixed contact assembly	Yes		
47	Nut, bolt & washer	Fixed & moving connector parts		Brass nut, bolt & washer
		Other		GI nut, bolt & washer
48	Silver plating thickness	15 microns		
49	Zinc coating thickness	100 microns		

5. GENERAL CONSTRUCTION

As per clause no 4.

6. NAME PLATE & MARKING

Below parameters should be embossed on Al sheet of thickness 0.4mm with black background. It should be riveted on MS channel of AB switch. There shall be three name plate for each phase.

- Name of Manufacturer
- PO no. with date
- Month & year of manufacture
- PROPERTY OF TPCODL/ TPNODL/ TPWODL/ TPSODL
- Item Description Material code

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 TP Odisha DISCOMs authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted on the 11KV Vertical AB switch in additions to others specified in the IS/IEC Standards. Bidder shall furnish the type test report of 11KV Vertical AB switch for the tests as mentioned below and as per reference standards. Complete set of Type Tests shall be conducted at certified test laboratories, which are CPRI / ERDA only. Type test should have been conducted in certified test laboratories during the period not exceeding 5 years from the date of Permission.

A. ACCEPTANCE TESTS:

Sr. No.	Test to be done	Reference	Clause no./Specified Process
1	Power Frequency Voltage Dry test	IS 9920-part 4	4.1
2	Satisfactory Operation Test	IS 9920-part 4	4.3
3	Measurement of resistance in main circuit	IS 9920-part 4	4.2
4	Visual and Dimensional checks	As per TP Odisha DISCOMs Specification	As per TP Odisha DISCOMs specification
5	Visual inspection	As per TP Odisha DISCOMs specification	There shall be no rust, sharp edges, burr and any kind of deformation on metallic components. Silicone rubber body shall be free from imperfections, contamination, cavity, pin holes cuts and other visual defects. End seals shall be intact.

6	Area and conductivity measurement of copper braid/rope and copper components	As per IS191 part 5, table 5 and TP Odisha DISCOMs specification	Test shall be conducted by measurement using micrometer and conductivity meter.
7	Verification of injection molding process over FRP rod.	As per TP Odisha DISCOMs specification	Test shall be conducted by dissecting the polymer body.
8	Scratch Testing on tin plated copper components for verification of tin coated plating process.	As per TP Odisha DISCOMs specification	Tin plating shall be scratched by using sharp edge flat tool. In case of spray coating, layer will be removed easily and coated layer will not fuse in the copper components.
9	Galvanizing test for- GI pantograph Operating Rod, cantilever, channel and base structure Post Insulator parts Nut and bolts	IS 4759	Cl.9

B. ROUTINE TESTS:

- Power Frequency Voltage dry test as per IS 9920 part-4 cl.4.1. Dimensional Check as per TP Odisha DISCOMs specification.
- Visual check as per TP Odisha DISCOMs specification.
- Satisfactory Operation Test as per IS 9920 part-4 cl.4.3.
- Measurement of resistance in main circuit as per IS 9920 part-4 cl.4.2.

C. TYPE TEST:

- Test for Temperature rise as per IS 9920 part4 cl.3.2.1
- Test to verify the insulation level including withstand test at power frequency voltages on auxiliary equipment test as per IS 9920 part4 cl. 3.1.
- Test to prove satisfactory operation and mechanical endurance as per IS 9920 part4 cl.3.5. Making and breaking test as per IS 9920 part4 cl.3.3.
- Short circuit withstand Test
- Test to prove the capability of the switch to carry the rated peak withstand current and rated short circuit current as per IS 9920 part4 cl.3.4.
- Measurement of the resistance of the main circuit.
- Tests to prove the integrity of the external insulation under conditions of the air pollution.

D. Type Test for Post Insulator:

- Dry Lightning impulse with-stand voltage test
- Wet power frequency test
- Mechanical failing load test.
- Radio interference test
- Recovery of hydrophobicity test
- Salt fog test: On insulators for 1000 hr as per IEC
- Chemical composition test for silicon content (Min 40%)
- Galvanization test
- Brittle fracture resistance test

8. TYPE TEST CERTIFICATE

The bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA/Govt. owned Lab as per the relevant standards not exceeding 5 years from the date of opening of the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, the same shall be carried out without any cost implication to TP Odisha DISCOMs. TP Odisha DISCOMs has rights for Surveillance tests of randomly selected samples from the third-party lab for quality checks of items. TP Odisha DISCOMs shall be intimated in case revision is done by the manufacturer in product design/ dimension/ material during the execution of the contract. Subsequently, Type test certificate shall be produced.

9. PRE-DISPATCH INSPECTION

The Material shall be subject to inspection by a duly authorized representative of the TPNODL. 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 TP Odisha DISCOMs representatives at all times when the work is in progress. Inspection by the TP Odisha DISCOMs 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 TP Odisha DISCOMs.

Following documents shall be sent along with material:

- Test reports
- MDCC issued by TP Odisha DISCOMs
- Invoice in duplicate
- Packing list
- Drawings & catalogue
- Guarantee / Warrantee card
- Delivery Challan
- Other Documents (as applicable).

10. INSPECTION AFTER RECEIVE AT STORE

The material received at TP DISCOM, Balasore, Odisha 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 Engineering and contracts department.

11. GUARANTEE

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under this 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 Purchaser up to a period of at least 48 months from the date of commissioning or 60 months from the date of last supplies made under the contract whichever is later, (the time scale of 48/60 months could be enhanced subject to mutual agreements). Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at bidder's risks and costs

and recover all such expenses plus the purchaser's own charge (@20% of expenses incurred), from the bidder or from the "Security cum Performance Deposit" as the case may be.

12. PACKING

Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.

13. TENDER SAMPLE

Bidder shall submit the sample of material during the tender evaluation process with the offer. (in case of first supply to TP Odisha DISCOMs)

14. QUALITY CONTROL

The bidder shall submit with the offered Quality 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 bought out items, and fully assembled components and equipment after finishing. 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 engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.

15. MINIMUM TESTING FACILITY

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

16. MANUFACTURING FACILITY

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.

17. SPARES, ACCESSORIES & TOOLS

NA

18. TRAINING

Bidder has to provide installation training as and when TPNODL required.

19. GTP

Bidder need to submit the point wise compliance.

20. DRAWING & DOCUMENT

Following documents shall be prepared based on TPNODL specifications and statutory requirements with complete

- BOM and shall be submitted with the bid:

- Completely filled in Technical Particulars.
- General description of the equipment and all components including brochures. Type test Certificates
- Experience List.

After 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 (Compact Disk CD) 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:

- Technical data sheet
- Drawing
- Sign copy of TS
- Clause wise compliance of TS
- Declaration of testing facility
- Declaration of manufacture facility
- No deviation
- Type test report

All the Documents and Drawings shall be in the English Language.

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

21. SCHEDULE OF DEVIATION

(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

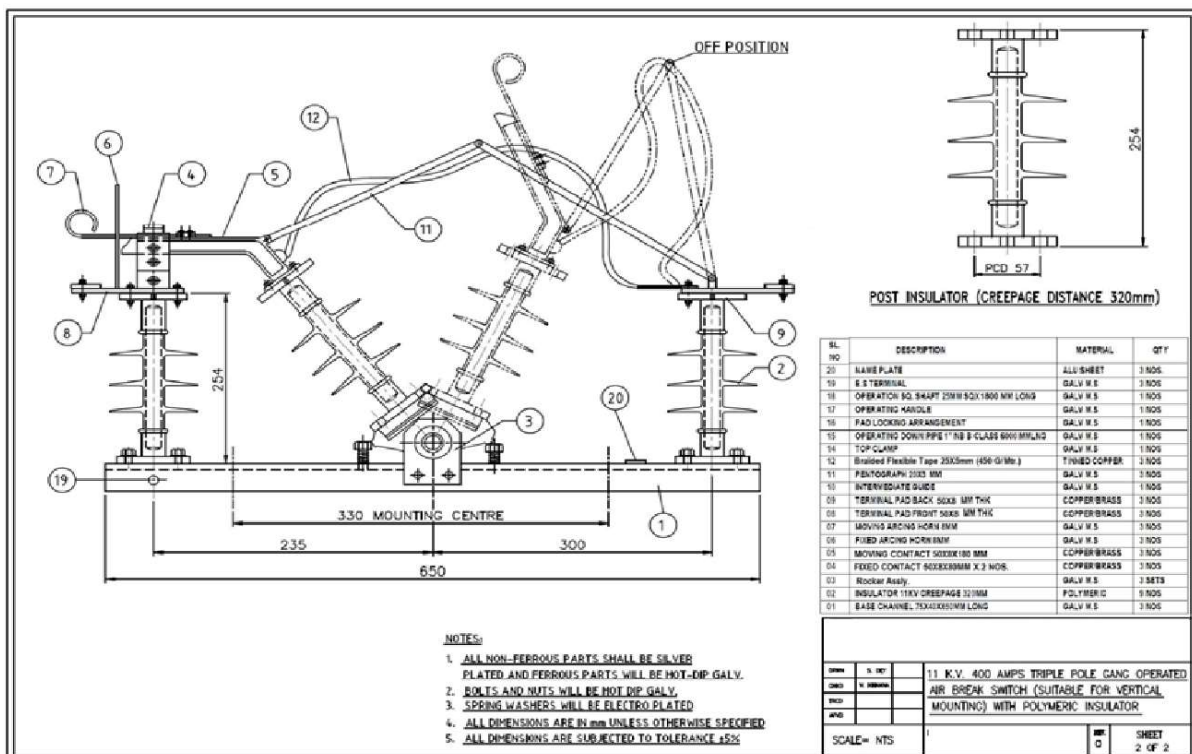
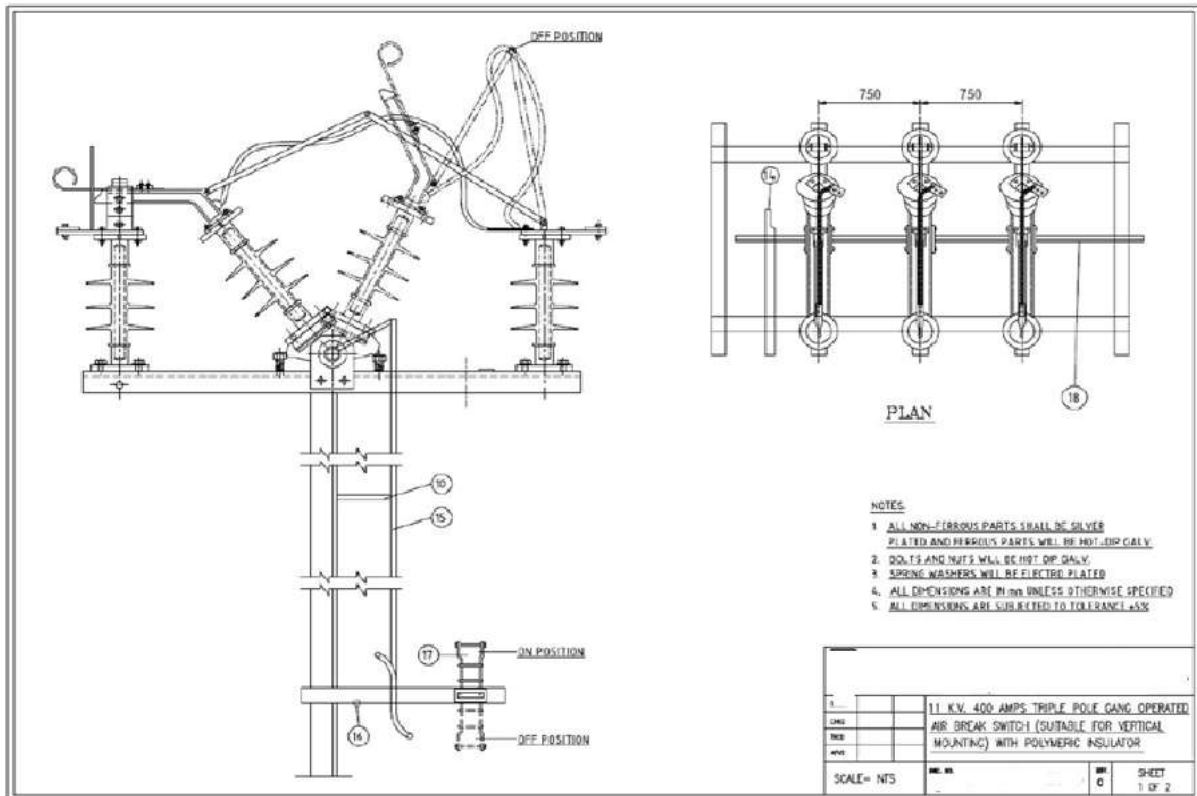
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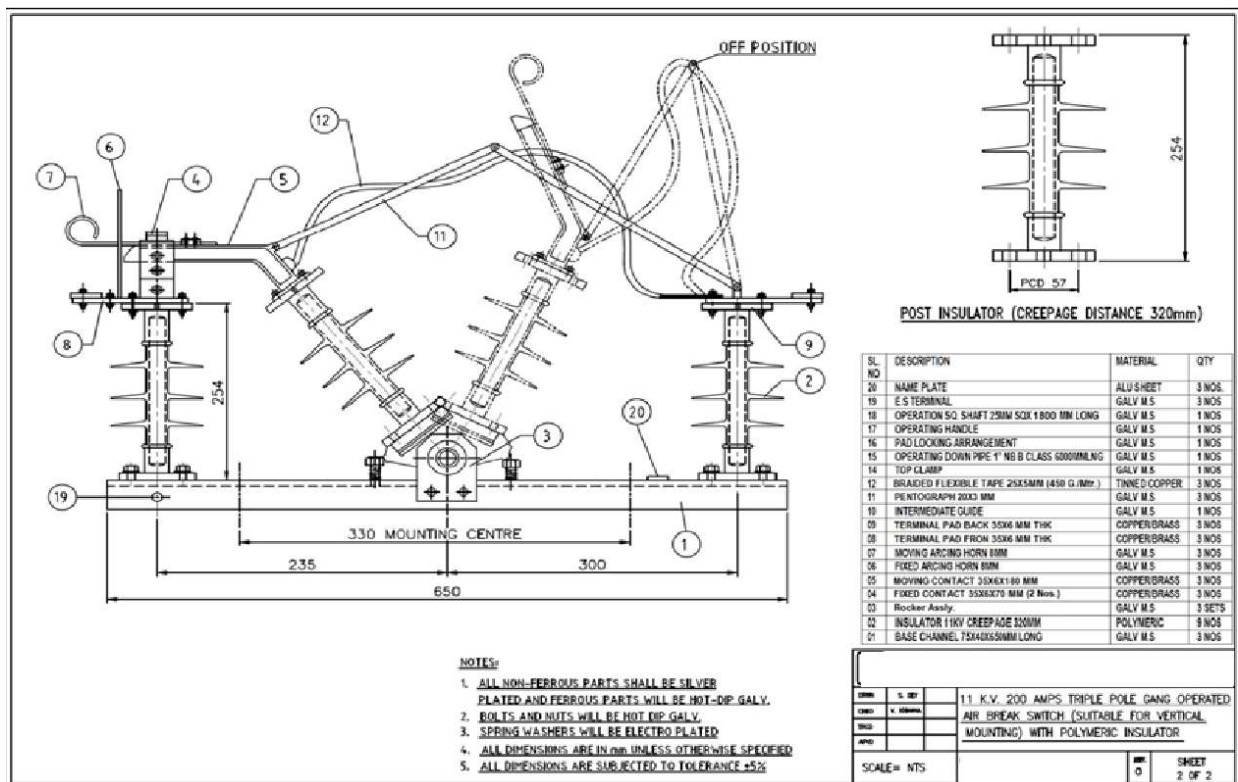
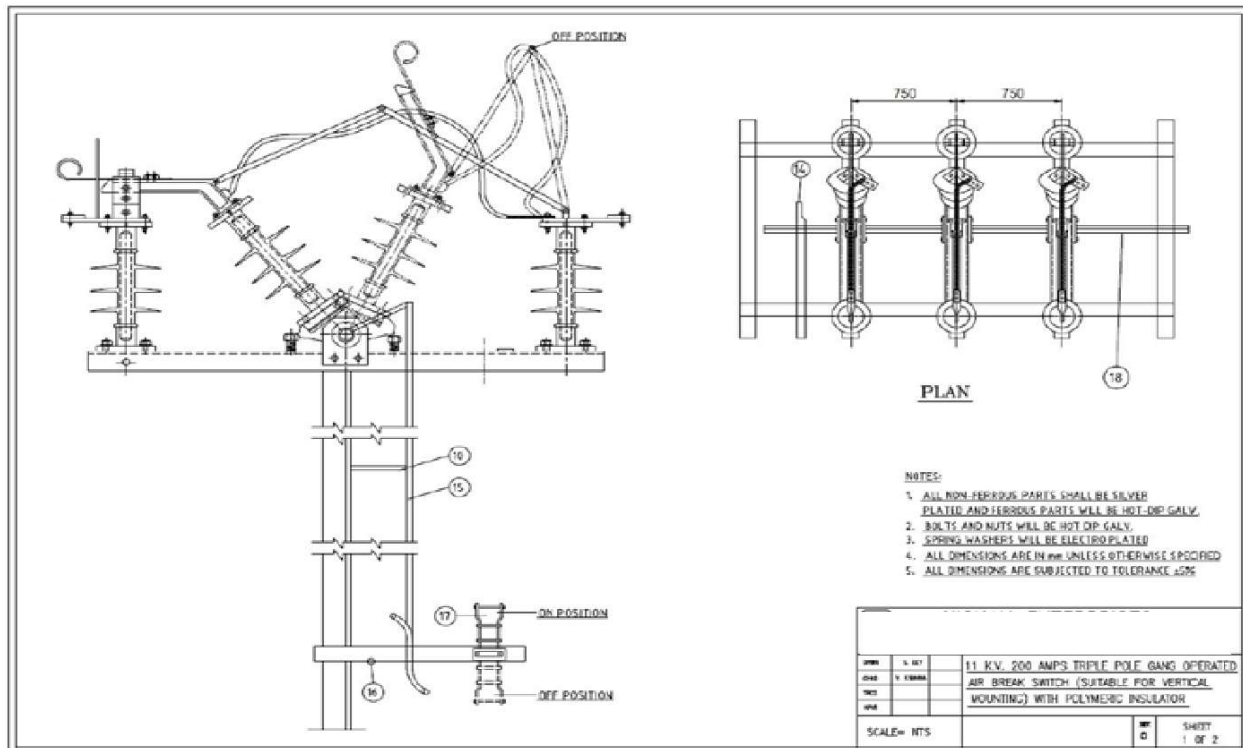
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Annexure-I

Indicative drawing of 11kV 400A 3P Vertical AB switch



Indicative drawing of 11kV 200A 3P Vertical AB switch



Indicative drawing of 11kV 200A 2P Vertical AB switch

