

TECHNICAL SPECIFICATION OF 33 KV & 11 KV AIR BREAK SWITCHES (With Polymer Insulators)

1. **SCOPE**:-This Specification provides for manufacturing, testing at works and supply of 33 kV & 11 kV A.B. Switches. The 33 kV & 11 kV AB Switches shall conform to IS: 9921 (Part-I to IV).

2. **CLIMATIC CONDITONS**:-The climatic conditions at site under which the equipment shall operate satisfactorily are as follows:-

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|--------|--|---|---|
| (i) | Peak ambient temperature in shade | : | 48 ⁰ |
| (ii) | Maximum average ambient temperature in 24 hours period in shade. | : | 45 ⁰ |
| (iii) | Maximum temperature attainable by an object exposed to sun. | : | 50 ⁰ C+ 45 ⁰ C=95 ⁰
{Peak ambient (Temp. rise at outdoor) of equipment} |
| (iv) | Minimum ambient temperature | : | 4 ⁰ C |
| (v) | Maximum relative humidity | : | 95 % (Some time approaches saturation point) |
| (vi) | Average number of thunder storm days per annum | : | 40 days |
| (vii) | Average annual rainfall | : | 125 cm |
| (viii) | Number of months of tropical monsoon | : | 3 |

For the purpose of specifications, the reference ambient temperature shall be 40⁰ C.

3. **A.B.SWITCHES**:- The 33 kV & 11 kV Air Break Switches are required with three poles in each phase. The A B Switches shall be supplied complete with phase coupling shaft, operating rod and operating handle. It shall be manually gang operated and vertically break and horizontal or vertical mounting type.

4. The equipment offered by the tenderer shall be designed for a normal current rating of 400 Amps. And for continuous service at the system voltage specified here as under:-

- | | | | |
|------|-----------------|---|--|
| (i) | 11 kV AB Switch | : | 11 kV + 10% continuous 50 C/s solidly grounded earthed neutral system. There-fore rated voltage will be 12 KV. |
| (ii) | 33 kV AB Switch | : | 33 kV + 10% continuous 50 C/s solidly grounded earthed neutral system. There-fore rated voltage will be 36 KV. |

The length of break in the air shall not be less than 310 mm for 11 kV AB Switches and 460 mm for 33 kV AB Switches.

4.1 CURRENT CARRYING CAPACITY:-

- i) The continuous current carrying capacity for 33 kV & 11 kV AB Switches shall be 400 Amps.

- ii) Rated short time current: - The rated short time current shall be 16 kA.
 - iii) Rated Peak withstand current: The value of peak current that the switch can withstand in the closed position shall be 40 kA.
 - iv) All current carrying parts should have current density less than 1.6 Amps/ mm Sq. and the minimum cross section for fixed contact shall be 300 Sq. mm. In case of flexible braded tape, the weight of tape shall be minimum 475 grams for 11 kV rating (length 650 mm) and 660 grams for 33 kV rating (length 900 mm) per phase including terminal bracket.
5. The 33 kV & 11 kV A.B. Switches are required with Polymer insulators. The A.B. switches should be suitable for mounting on the structure. The mounting structure will be arranged by the purchaser separately. However, the AB Switches shall be supplied with base channel for mounting on the structure. The phase to phase spacing shall be 1200 mm in case of 33 kV AB Switches & 750 mm in case of 11 kV AB Switches.
6. **COMPOSITE POST INSULATORS (POLYMER):** - The complete set of three phase AB Switches shall have stacks of post insulators as given below:-
- 33 kV AB Switches: 1Nos. 33 kV Post Insulators per stack, total 9 Nos. for one set of AB Switch.
- 11 kV AB Switches: 1 No. 11 kV Post Insulator per stack, total 9 Nos. for complete AB Switch.

The Polymer post insulators should conform to the latest applicable respective IS and IEC 61109 for polymer insulator. Creepage distance should be adequate for highly Polluted outdoor atmosphere. The minimum creepage of 320 mm for 11 kV and 900 mm for 33 kV will be necessary.

The insulators and metal parts shall be assembled in such a manner that any thermal expansion differential between the metal and insulators parts through the range of temperature variation shall not loosen the parts or create undue internal stresses which may affect the electrical or mechanical strength.

(a) **Type Test:-** Bidders have to submit the self-attested copy of type test report of polymer post insulators as per respective IS and IEC 61109 carried out at CPRI or ERDA for the make of Post Insulator to be used alongwith the offer for verification.

(b) **Experience:-** The polymer insulator manufacturer must have experience of manufacturing and supply of Polymer Insulator at least for 3 years. The bidder shall submit requisite documents as mentioned above for last 3 years.

(c) **Debar/Blacklisting:-** Manufacturer of Insulator should not be debarred/blacklisted by the State Govt./Central Govt./ State PSU/Central PSU/SEB/Power Utility as on the date of opening of tender. A declaration in this regard shall be furnished by manufacturer.

7.11 kV & 33 kV Post Insulators should have technical particulars as detailed below:-

	<u>11 kV</u>	<u>33 kV</u>
(i) Nominal system voltage kV (rms)	11	33
(ii) Highest system voltage kV (rms)	12	36

(iii)	Dry Power Frequency one minute withstand voltage (rms)	35	75
(iv)	Wet Power frequency one minute withstand voltage (rms)	35	70
(v)	Power Frequency puncture voltage.	1.3 times the actual dry flashover voltage.	
(vi)	Impulse withstand voltage kV (Peak)	75	170
(vii)	Visible discharge voltage kV (rms)	9	27
(viii)	Creepage distance in mm (minimum)	320	900

Technical specification of 11 kV & 33 kV Composite Post Insulator (Polymer) is as per attached schedule IX & X.

8. The rated insulation level of the AB Switches shall not be lower than the values specified below:-

S. No.	Standard declared voltage kV/RMS.	Rated Voltage of the A.B. Switches.	Standard impulse with stand voltage (positive & negative polarity kV {Peak}		One Minute power frequency withstand voltage kV (rms)	
			Across the isolating distance	To earth and between poles.	Across the isolating distance	To earth and between poles.
i.	11kV	12 kV	85 kV	75 kV	32 kV	28 kV
ii.	33 kV	36 kV	195 kV	170 kV	80 kV	70 kV

9. **TEMPERATURE RISE**:- The maximum temperature attained by any part of the equipment when in service at site under continuous full load conditions and exposed to the direct rays of sun shall not exceeds 45⁰ C above ambient.

The corrections proposed shall be stated in the tender and shall be subject to approval of the purchaser.

10. **MAIN CONTACTS**:- AB Switches shall have heavy duty self ligning type contacts made of hard drawn electrolytic copper/heavily tinned .The various parts should be accordingly finished to ensure interchangeability of similar components. The moving contacts of the switch shall be made from hard drawn electrolytic copper heavily tinned. These contacts shall have dimensions as per drawing attached so as to withstand safely the highest short-circuit currents and over voltage that may be encountered during service. The surface of the contact shall be rounded smooth and heavily tinned. In nut shell the male and female contacts assemblies shall ensure.

- i) Electrodynamic withstand ability during short circuits without any risk of repulsion of contacts.
- ii) Thermal withstand ability during short circuits.
- iii) Constant contact pressure even when the lower parts of the insulators stacks are subjected to tensile stresses due to linear expansion of connected bus bar of flexible conductors either because of temperature variations or strong winds.
- iv) Wiping action during closing and opening.
- v) Fault alignment assuring closing of the switch without minute adjustments.

Typical general arrangement is shown in attached drawing. This is only a general arrangement drawing showing clearances and type of material to be used. However, tenderers should submit a detailed dimensional drawings alongwith their offer.

11. CONNECTORS:- The connectors shall be made of Aluminium with Brass connecting plates with 2 bolt connection with AB Switch Plate for Rabbit ACSR conductor for 11 kV and Dog ACSR conductor for 33 kV AB Switches. The connector should be 4 bolt type. The connectors drawing shall be as approved by CSPDCL.

12. OPERATING MECHANISM:- All A.B. Switches shall have separate independent manual operation. They should be provided with on ON / OFF indicators and padlocking arrangements for locking in both ON & OFF positions to avoid unintentional operation. The isolating distances should also be visible for the A.B. Switches.

The AB Switch will be supplied with following accessories:-

S. No.	Item	Size of 11 kV AB Switch	Size of 33 kV AB Switch
i.	Operating Rod (GI dia)	Length: 6.00 meter Outer dia: 32 mm	Length: 6.00 meter Outer dia:40 mm
ii.	Phase coupling square rod (GI)	Length 1800 mm Size 25x25 mm	Length 2700 mm Size 40x40 mm
iii.	Operating handle (GI)	1 No.	1 No.

The A.B. Switches shall be capable to resist any chance of opening out when in closed position. The operating Mechanism should be of robust constructions, easy to operate by single person and should give good mechanical leverage with minimum loss of motion. Additional leverage should be provided to maintain mechanical force with minimum efforts. The GI Pipe should conform to IS:1239-68. The vertical down rod should be provided with adequate joint in mid-section to avoid bending or buckling.

All iron parts should be hot dip galvanized. All brass parts should be silver plated and all nuts and bolts should be hot dip galvanized.

13. ARCING HORNS:- It shall be simple and replaceable type. They should be capable of interrupting line charging current. They shall be of first made and after break type.

14. BUSH:- The design and construction of bush shall embody all the features required to withstand climatic conditions specified so as to ensure dependable and effective operations specified even after long periods of inaction of these Air Break Switches. They shall be made from highly polished Bronze metal with adequate provision for periodic lubrication through nipples and vent.

15. DESIGN, MATERIALS AND WORKMANSHIP:- The successful tenderers shall assume full responsibility for co-ordination and adequate design. All materials used in the construction of the equipment shall be of the appropriate class, well finished and of approved design and material. All similar parts should be accurately finished and interchangeable.

Special attention shall be paid to tropical treatment to all the equipment as it will be subjected during service to extremely severe exposure to atmospheric moisture and to long period of high ambient temperature. All current carrying parts shall be of non-ferrous metal or alloys and shall be designed to limit sharp points / edges and similar sharp faces.

16. GUARANTEED DATAS AND OTHER TECHNICAL PARTICULARS:-

Guaranteed data and other technical particulars of the AB Switches should be given in Schedule enclosed herewith. Any other particulars considered necessary by the supplier may also be given in addition to those listed in the schedule.

17. The tenderer should note that alongwith the tender, the following type test certificate must be furnished. The type test should be from CPRI / ERDA or other equivalent Govt. approved lab:-

- (i) Test to prove capability of rated peak short circuit current and the rated short time current. The rated short time current should correspond to minimum of 16 kA and the peak of short circuit current should correspond to minimum of 40 kA.
- (ii) Lightning impulse voltage test with positive & negative polarity.
- (iii) Power Frequency voltage dry test and wet test.
- (iv) Temperature rise test.
- (v) Millivolt drop tests.

The above tests should be performed on the AB Switches, manufactured as per Company's drawing enclosed with the specification. Along with the type test certificate, the certified copy of the drawing (from the testing lab) should also be kept for inspection of our officer if so desired.

It may be noted carefully that the type test reports submitted by the bidders will be sent to the testing laboratory / institution from where the type test are carried out for verification & genuineness. In case any discrepancy is reported by Testing Laboratory / Institution the offer/LOA/Order will be outrightly rejected and the action against the bidder for submission of forged / fake type test report will be taken in accordance with Clause 34 of Annexure-B (GENERAL TERMS & CONDICTIONS OF PURCHASE)

18.DRAWINGS:

The drawings enclosed with this tender are only general arrangement drawings showing clearances and material to be used. However, tenderers should submit a detailed dimensional drawing along with their offer.

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