Annexure- ‘B’

#### Technical specification for 11 KV 3 pin type 400 AMPS, A B Switch

* 1. **Scope:-**

The specifications cover the manufacture, testing and supply of 12 KV 400 AMP 3 pin type Gang operated A.B. Switch for use in over head distribution lines / distribution sub-stations of the **Jharkhand State Electricity Board**. The operating voltage of the lines is 11 KV + 12.5% and the neutral solidly earthed.

#### Applicable Standards:-

Unless otherwise stipulated in this specification the A.B. Switches shall conform to IS:9920 (part-I to IV).

#### Climatic conditions.

* + 1. Peak ambient temperature in shade 43°C
    2. Maximum average ambient temperature

over a 24 hour period in shade 32°C

* + 1. Maximum ambient temperature 48°C
    2. Maximum temperature attainable by an

object exposed to sun 60°C

* + 1. Maximum relative humidity 100°C
    2. Average number of thunderstorm days per 50 days annum
    3. Average number of rainy days per annum 80 days
    4. Average annual rainfall 1270 mm.
    5. Number of tropical monsoon conditions 4 months
    6. Maximum wind pressure 100 kg/m²
    7. Attitudes not exceeding (above M.S.L) 1000 meters

#### Rated voltage:-

The rated voltage shall be 12 KV

#### Rated normal current:-

The rated normal current shall be **400 A**

#### Rated lightning Impulse withstand voltage Kv (peak)

* + 1. To earth and between poles 75 KV
    2. Across the terminals of open switch 85 KV

#### Rated one Minute power Frequency withstand voltage KV (ms):-

* + 1. To earth and between poles 28 KV
    2. Across the terminals on open switch 32 KV

**NOTE**:- The withstand values in clause 6 & 7 shall apply at the standard reference atmospheric (Temperature, pressure and humidity) specified in IS 2071 (part-I) 1974.

#### Temperature rise:-

The temperature rise shall not exceed two maximum limits specified below:- Temp. rise limit at ambient temp. not exceeding 40°C

Copper contact (Silver faced) in air 65°C

Terminals of the switch intended to be

connected to external conductors by bolts 50°C

#### Rated short time current:-

The rated short time current shall be 16 KA

#### Rated peak withstand current-

The value of peak current that the switch can withstand in the closed position shall be 40 KA

#### Rated mainly active load breaking capacity-

The rated mainly active load breaking capacity shall be 10 A

#### Rated Transformer off load breaking capacity-

Rated transformer off load breaking capacity shall be 6.3 A(rms)

#### Rated line charging breaking capacity-

The rated line charging breaking capacity shall be 2.5 A (rms)

#### Rated cable charging breaking capacity-

The rated cable charging breaking capacity shall be 10 A (rms)

#### Contractual Details-

* + 1. **Switch type & Design**:-

The switch shall be suitable for horizontal mounting on the standard double pole structure of the Board. The switch shall be of rotating type with one post insulator per stack and single throw, double break characteristic. It would be complete with Arcing Horns Down pope and operating Mechanism. The case shall be of 75x40 mm MS Channel.

#### Post Insulators:-

The post insulator should conform to IS 2544-1973 (latest issue) with original cementing by the manufacturer of insulators. The guaranteed technical particulars of the post insulator to be use in the A B switch shall be furnished along with manufacturer’s name and catalogue number.

* + 1. **Blades**:-

The blades would be made from a single length of rolled electrolytic grade copper flat of adequate size matching with current capacity. This should be capable of carrying rated current continuously and fault current safely. These shall be silver plated only either ends to cover the contact areas adequately. The blades shall be supported on M S Angel sections of adequate dimensions i.e. of 35 x 35 x 5 mm. the blade should have smooth wiping action the fixed contact.

#### Fixed Contact:-

The fixed contact element shall be made of roles extruded electrolytic grade copper flat bend in such a way to have reverse directional flow of current and avoid paralled flows path. The contact assembly shall be so robustly designed that while carrying the rated continuous current, the temperature rise does not increase beyond 65 degree C over an ambient of 48 degree C. The fixed contact assembly shall be stainless steel spring loaded and of high pressure and self alighting type. The rise of temperature is due to the passage of rated short circuit for a period of one second shall not cause any annealing or welding of contact copper contacts elements will be silver-plated.

The various parts should be finished to ensure interchangeability of similar components.

#### Terminal & connector:-

The terminal shall be made of rolled/extruded 90% electrolytic grade copper flat having a cross sectional are a equal to that of the blade. It shall be so constructed that on intimate with the contact elements is ensured and provision is made to blot with two # 3/8” dia Galvanised bolts & nuts A cost aluminium connector suitable to take

conductors up to the size of AAAC/ACSR 100 mm² using two # 3/8” dia bolts and nuts. The terminal shall be silver-plated.

These case aluminum connectors shall be supplied for each phase of the switch. The design of the connector shall be such that at no connector place its cross sectional area is less that twice the cross sectional or of the copper blade.

#### Arcing Horns:-

The arcing horn shall be 8 mm M S Rod one end of each arcing horn shall be soundly welded to a 25x6mm MS Flat which in turn shall be fitted to the switch using two # 5/16” dia galvanized bolts and nuts. The arcing horn shall be spring fitted against one another.

#### Bearings:-

The crank for the relating stack shall be of 75x6mm M S Flat. The crank shall first be riveted to a M S Rod of a minimum diameter of 32 mm and then soundly welded to it. The effective mean diameter of this relating shaft shall be a minimum welded to it. The effective mean diameter of this relating shaft shall be a minimum of 25 mm. The rotating shaft shall rotate through gunmetal bush bearing. All housed in a weatherproof housing. It will have a greasing nipple to meet the requirement. A detail dimensional sketch of the bearing may a submitted with the tender.

#### Phase Coupling Bar:-

The bar required for a coupling the rotating of all the three phases would be of ¼” IPSGI (Indian pipe size galvanized irons) pipe in 6½ ft length. The fixing arrangement for the phase coupling bar to the cranks of the rotating stacks shall be such as to permit a smooth movement of the coupling bar on operation of the switches without any bending and looseness.

#### Down pipes:-

The down pipe of the A B Switch shall be of 1” IPSGI pipe and its length ID is such that when the blades of the switch are at a height of 19ft the operating handle is 3½ from the ground level. A suitable guide shall be provided for intermediate position of the down pipe.

#### Operating Mechanism:-

Operating mechanism would be suitable from manual operation. It shall make it possible to effect a smooth and fully controlled movement of the three blades simultaneously through out the entire cycles of operation. Adjustment steps shall be provided at either end of the mechanism of stop the handle in the ON and OFF position. Pad locking arrangement for the handle in the ON and OFF position should be clearly indicated on the stand.

#### Galvanising:-

All ferrous parts of the switches shall be hot dip galvanized as per IS 2629-1969 (latest amendments). The steel pipes used in phase coupling bar and down pipe shall be galvanized in accordance with IS – 4736 – 1968 (latest amendments).

#### Name Plate:-

Each set of A B Switches shall be provided with the following information-

* + - 1. The manufacturer’s name and address
      2. Rate voltage
      3. Rate current
      4. Rated one second short time current
      5. Make’s Sl #
      6. Year of manufacturing

#### Type-Test-

The A B Switches shall be subjected to the following type tests in accordance with IS 9920 as applicable-

1. De-electric test
2. Temperature rise test (for contacts and terminals)
3. Short time current and peak withstand current test.
4. Operation and mechanical Endurance test will be done in manufacturing unit during pre-despatch inspection test.

The type-test certificate from CPRI only in respect of switches offered against above applications must submit with the tender. The tender will not be considered in absence of above test certificate.

#### Routine Test:-

The A.B. Switches shall be subjected to the following routine tests:-

* + 1. Power frequency voltage dry test.
    2. Measurement of the resistance of main circuit.
    3. Operating test.

#### Inspection:-

All tests and inspection shall be made at the place of manufacturer by the authorised inspecting officer of the Board. The manufacturer shall offered the inspector representing the Board all reasonable facilities without charge, to satisfy him that the material is being furnished in accordance with the specification. The inspector of the Board will test & inspect at least 10% of the offered quantity and after being satisfied with the result of the test, he will sign each part of the switch and seal it properly. One set of such tested, signed and sealed sample of the switch will be sent to each consignee stores at the time of delivery of material against specific dispatch instruction.

The purchaser has the right to have the tests carried out at his own costs by an independent agency whenever there is dispute regarding the quality of supply.

* 1. **Packing**:-

The Air Break switch has shall be delivered suitable packed in wooden crates. Care should be taken for packing of post insulators against breakages. Although the method of packing is left to the discretion of manufacturer, it should be robust for rought handling that is accessioned during transportation by rail / road.

* 1. **Drawing**:-

Four sets of detailed dimensional drawings of each part of the complete air-break switches alongwith operating instructions shall have to be submitted alongwith the tender.

#### Guaranteed Technical particulars:-

The Guaranteed Technical particulars of the air break switches alongwith associated post insulators shall be given by the bidder as per appendix ‘E’. This is essential for consideration of the tender failing which the tender will be rejected.