

MAHARASHTRA STATE ELECTRICITY DISTRIBUTION CO. LTD.
SCHEDULE - 'A'

TECHNICAL SPECIFICATION FOR 11 kV & 22 kV A.B. SWITCH.
SPECIFICATION NO:RE/III/A.B.SWITCH/2005

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MAHARASHTRA STATE ELECTRICITY DISTRIBUTION CO. LTD.
TECHNICAL SPECIFICATION FOR 11 kV & 22 kV AIR BREAK SWITCH
SCHEDULE - 'A'

SPECIFICATION NO: RE/II/A.B.SWITCH/2005

1. SCOPE :-

This specification covers the design, manufacture & testing at works and supply of air-break isolators suitable for 11 kV & 22 kV system voltages.

2. WEATHER CONDITIONS :-

The materials used in the construction of A.B. Isolators shall be suitable for use under the following weather conditions.

- i) Temperature from 40°C to 60°C.
- ii) Relative Humidity 50% to 100%
- iii) Altitude: 0 to 1000 meters above M.S.L.

3. SYSTEM VOLTAGES :-

The systems on which the isolators will be installed will be:

- i) 11 kV , 3 phase, 50 Hz with solidly earthed neutral system.
- ii) 22 kV , 3 phase, 50 Hz with solidly earthed neutral system.

The rated voltage shall be 12 kV/24 kV.

4. APPLICABLE STANDARD :-

Unless otherwise stipulated in this specifications, the A.B. switches shall conform to IS 9921/1985 (Part I to IV) or its latest amendment. In case of difference, if any, between this specification and the IS 9921, the provisions of this specification will hold good.

5. CURRENT CAPACITY:-

5.1) Current Carrying Capacity :-

The continuous current carrying capacity for the different system voltages shall be as under:

<u>System Voltage</u>	<u>Current carrying capacity</u>
a) 11 kV	400 Amps.
b) 22 kV	400 Amps.

5.2) Rated short time current :-

The rated short time current for 1 sec. shall be 16 kA.

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5.3) Rated peak withstand current :-

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

5.4) Rated mainly active load breaking capacity :-

The rated mainly active load breaking capacity shall be 10 A.

5.5) Rated transformer off-load breaking capacity :-

The rated transformer off-load breaking capacity shall be 6.3 A(rms).

5.6) Rated line-charging breaking capacity :-

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

5.7) Rated Cable charging Breaking Capacity :-

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

6. NUMBER OF POSTS :-

Number of posts per phase for different system voltages shall be as under :-

TYPE "A" A.B.SWITCHES (ISOLATOR)

- i) 11 kV three posts per phase. Each post having single insulator unit.
- ii) 22 kV three posts per phase. Each post having stack of two 11 kV Post Insulators .

7. GENERAL REQUIREMENTS :-

7.1 A.B.SWITCH IN GENERAL :-

The A.B.switch shall be of outdoor type. They shall be of triple pole, gang operated type and shall be suitable for horizontal or vertical installation. The A.B. switch should be with arcing horns. The sizes of rods used for arcing horns would be 8 mm. M.S. hot dip galvanised. The current carrying connectors should be of two-bolt type having nuts and bolts, with spring washer & plane washers. Connectors shall be of tinned copper. All ferrous parts shall be hot dip galvanised and copper parts heavily tinned.

All current carrying parts should have current density less than 1.6 Amps/mm.sq. & the minimum cross section for fixed contact shall be 300 sq.mm. In case of flexible copper braided tape, the weight of tape shall be minimum 475 grams for 11 kV rating and 675 grams for 22 kV rating per phase including terminal bracket.

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ALL joints in current carrying path shall be of two bolt type. Each joint shall be provided with one plane and one spring washer of not less than 2 mm thickness even if it is not shown in the drawings.

7.2 POST INSULATORS :-

Design and manufacture of post insulator to be used in A.B.Switch assembly should be such as to avoid stress concentration due to direct engagement of the porcelain with the metal fittings and retention of water in the recesses of metal fittings.

The post insulator unit shall be assembled in a suitable Jig, to ensure the correct positioning of the top and bottom metal fittings relative to one another. The faces of metal fittings shall be parallel and at right angle to the axis of insulator and corresponding holes on top and bottom metal fittings shall lie in a vertical plane containing the axis of the insulator. The cap and the pedestal must not become loose. The pedestal should be of malleable cast iron and cap should be of malleable cast iron or aluminium. The vertical alignment of post insulator must not vary after operations.

The Insulator, M.C.I./Al.Cap and M.C.I. pedestal of post insulators shall bear the markings of original manufacturers like JSI, HTIF, BHEL, WSI, SIL etc. and their monograms. At present the acceptable makes of post insulators are as given below :

M/S.BIRLA NGK INSULATORS PVT.LTD	JSL-1111D (original Jaya Shree make)
M/S.BHEL MAKE	4-984-04-00200.
M/S.HTIF MAKE	PT-3003.
M/S.PUNJAB CERAMIC	2500018.
M/S.W.S.INSL	WSI-112A-701
M/S.ALLIED CERAMIC	AC-TM-006 & AC-044.
M/S.INDIA POTTERIES	IP-022 & IP-044.
M/s.PRATHAM CERAMICS	PC-T 33001 & PT-1

For any other equivalent make of post insulators, the bidders should submit the complete type test reports alongwith the offer for scrutiny and approval of the Company. However the post insulator used for A.B.switch shall be as per Company's choice. Each post insulator shall have minimum creepage of 320 mm and should conform to the requirements of IS:2544/ 1973 (amended upto date).

7.3 FIXED AND MOVABLE CONTACT SYSTEM:-

The fixed & moving contacts material shall be electrolytic hard-drawn copper heavily tinned. The contact shall be of high pressure and self aligning type with positive wiping action and minimum contact pressure shall be 1/4 lb. per amp. of current carrying capacity.

Supplier has to supply A.B.Switch units manufactured only as per the details given in the enclosed drawings No.

i) 63.726(R-1) sheet 1/2

ii) 63.726(R-1) sheet 2/2

Hence tenderer successful in getting LOA / order, is not required to take drawing approval from the Chief Engineer (Dist.) .

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7.4 MECHANICAL STRENGTH :-

A.B.Switches shall withstand rated mechanical terminal load and electromagnetic forces without impairing their operational reliability or current carrying properties.

7.5 SECURING POSITIONS :-

Isolators inclusive of their operating mechanism should not come out of their open or closed positions by gravity, wind pressure, vibrations or reasonable shocks.

Isolators shall be capable of resisting in closed position the dynamic and thermic effects of the maximum possible short circuit current at the installation point and should not open under the influence of short circuit current.

7.6 NAMEPLATE :-

Isolators shall be provided with a nameplate containing following information.

- a) Name of manufacturer.
- b) Order reference.
- c) Rated voltage-kV
- d) Rated normal current in Amps.
- e) Rated one second short-time current in Amps.
- f) Year & Month of Manufacture.

Name of manufacturer should also be provided on the operating device.

The nameplate should be riveted to the base channel at the center of each pole and operating mechanism including parts. Sticker may be used for parts of operating mechanism.

7.7 PHASE TO PHASE CLEARANCE :-

The phase to phase clearance shall be as under :-
System Voltage. Phase to phase clearance

11 kV	75 cm.
22 kV	122 cm.

7.8 ISOLATION DISTANCE :-

The minimum distance between the fixed and the nearest part on the moving contact in the completely open position should not be less than the following for different system voltage.

<u>System Voltage</u>	<u>Min.Isolating Distance</u>
11 kV	31 cm.
22 kV	46 cm.

The withstand level across the break,shall be as specified under type test.

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7.9 OPERATING MECHANISM :-

This should comprise of `B' Class G.I. Operating pipe of 32 mm outer diameter and 6 meter length in single piece without joint. The mechanism should give good mechanical leverage with minimum of loose/lost motion. There should be provision for pad-locking in both `on' and `off' position.

8. TESTING FACILITIES, TESTS & TEST CERTIFICATE :-

The tenderer must clearly indicate what testing facilities are available in the works of manufacturers and whether the facilities are adequate to carry out all Routine, Acceptance as well as Type Tests. The facilities should be available to Company's Engineers if deputed to carry out or witness the tests in the manufacturer's works.

If any test can not be carried out at the manufacturer's works, the reasons should be clearly stated. The A.B.Switch shall be tested in accordance with the procedures detailed in IS:9921/1985 (amended upto date).

8.1 Routine Tests :-

Every switch manufactured and to be supplied against the Company's order will be subjected to routine tests mentioned below:

i) Power frequency voltage test(Dry) on isolators which are completely assembled at Manufacturer's works. The test should comply with the following:

System voltage :	One minute Power Frequencies withstand voltage, to earth and between poles(Dry.)
11 kV	: 28 kV R.M.S. as per IS 9921/1985 (amended upto date).
22 kV	: 50 kV.

ii) Measurement of resistance of the main circuit.

This test should comply with clause No.4.2 of IS:9921(Part-4) /1985 (amended upto date).

iii) Tests to prove satisfactory operation.

iv) Manufacturers test certificates for Acceptance and Routine tests on post type insulators as per IS 2544/1973(amended upto date).

iii) Acceptance tests for complete Isolators:-

The following shall be acceptance tests for complete Isolators:

- Temperature rise test as per IS:9921/1985(amended upto date).
- Measurement of resistance of the Main Circuit.
- Power frequency voltage(Dry) test on Main circuit.
- Verification of dimensions.
- Mechanical test on post insulators as per IS:2544/1973 (amended upto date)
- Galvanizing test as per IS:2633(amended upto date)

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vi) Original manufacturer's test certificate of insulators shall be made available to the E.E.(IW). If required these insulators shall be inspected at the cost of supplier at any laboratory acceptable to the Company in the presence of E.E.(IW).

vii) Original copies of invoice, documentary evidence of payment of excise duty, challan and certificate of insulator manufacturer for original cementing shall also be made available to E.E.(IW) and attested copies of the same shall be submitted to C.A.O.(SB), MSEDCL, Mumbai.

The A.B.Switch shall be supplied duly assembled.

8.2 Type Tests:-

The type tests should be carried out in accordance with IS:9921/1985(amended upto date) . However the various type tests are mentioned below.

- a) Temperature rise test.
- b) Measurement of Resistance of Main Circuit.
- c) Short Circuit current carrying capability for 1 second.The short time current rating for 1 second should be 16 kA.
- d) Mechanical Endurance test.
- e) Test voltages for impulse withstand and power frequency(Dry & wet) withstand should comply with the following specified values.

System Voltage	Standard Impulse voltage	Power frequency voltage	One minute withstand	One minute withstand
	with +ve & -ve Polarity.	(Dry & Wet)		
	: Across the	To earth	: Across	To earth and
	: Isolating	& between	: Isolating	between poles
	: distance	poles(kV	: Distance	kV R.M.S.
	: (kV Peak)	Peak).	: kV R.M.S.	
11 kV	85	75	32	28
22 kV	145	125	60	50

9. CHARACTERISTICS FOR INSULATORS :-

The insulators should be post type insulators only and should conform to the following test voltages.

System Voltage	Power Frequency Dry flashover	Power frequency Wet flashover	Impulse flashover
11 kV	80 kV	50 kV	125 kV
22 kV	120 kV	85 kV	160 kV

The tenderer should arrange at his cost for testing of Post Insulators at any laboratory acceptable to Company, for Acceptance Tests as per IS:2544/1973(amended upto date) in presence of our representative. Manufacturer's test certificate for original cemented post insulators shall also be submitted at the time of Inspection.

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10. TEST CERTIFICATE :-

The tenderer shall furnish detailed type test reports of the offered 11 kV & 22 kV A.B.Switches for the tests as per clause 8.2 of this specification. All the above Type Tests shall be carried out as per the procedures given in IS 9921(PART IV)/1985(amended upto date) or latest version thereof at laboratories which are accredited by the National Accreditation Board of Testing and Calibration Laboratories(NABL) of Government of India to prove that the 11 kV & 22 kV A.B.Switches offered meet the requirements of the specification. These tests should have been carried out within five years prior to the date of opening of this tender. However, the tenderers who have supplied the 11 kV & 22 kV A.B.Switches to this Company against order from Central Purchase Agency of M.S.E.D.C.L. shall be exempted from submission of type test reports against this tender provided

- (i) their offered 11 kV & 22 kV A.B.Switches are already fully type tested at Laboratories accredited by the National Accreditation Board for Testing and Calibration Laboratories(NABL) within five years prior to the date of opening of the tender
- (ii) there is no change in the design of type tested 11 kV & 22 kV A.B.Switches and those offered against this tender
- (iii) such tenderers complying (i) and (ii) above shall furnish an undertaking in the format scheduled 'G' enclosed herewith.

The detailed type test reports alongwith the relevant oscillograms/ certified drawings etc. or undertaking seeking exemption from their submission in the format schedule 'G', are to be submitted in sealed cover on or before 14.00 hours on the same date of the month two months after the date of tender opening(e.g. if the tender is opened on 3rd June, the submission of type test reports shall be on or before 3rd August) or the next working day in case the same date is a holiday duly superscribed on it following details :

" Type Test Reports of 11 kV & 22 kV A.B.Switches against Tender SP/T-09--/---- "

The sealed covers shall be opened at 15.00 hours on the same day in presence of the tenderers who choose to be present.

The purchaser reserves the right to demand repetition of some or all the Type Tests in presence of purchaser's representative at purchaser's cost. For this purpose, the tenderer shall quote unit rates for carrying out each Type Test. However, such unit rates will not be considered for evaluation of the offer. In case the unit fails in the type tests, the complete supply shall be rejected.

The successful tenderer shall take approval / waiver of type tests from C.E.(Dist.), M.S.E.D.C.L, Prakashgad, Bandra , Mumbai prior to commencement of supply.

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11. DESPATCHES:-

From the A.B.switches received in the Stores, two sample switches shall be taken out by our authorised Executive Engineer/Foreman (O&M Division) and all dimensions will be checked and every sample cutout will be subjected to test for its trouble free operation. A minimum of 50 (Fifty) operations shall be performed on each sample. The payment/S.R note shall be released only after satisfactory test for trouble free operation as stated above.

12. SCHEDULES:-

12.1 The tenderer shall fill in the following schedules which form part of the tender specification and offer.

Schedule `C' - Tenderer's Experience.

Schedule ' G ' - Proforma of undertaking

12.2 The tenderer shall submit the list of orders for similar type of equipments executed or under execution during the last three years, with full details in the schedule of Tenderer's experience (Schedule `C') to enable the purchaser to evaluate the tender.

13.0 DRAWINGS ENCLOSED :-

The following drawings are enclosed:

- i) 63.726 (R-1) Sheet 1/2
- ii) 63.726 (R-1) Sheet 2/2

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SCHEDULE ' C '

Tenderer shall furnish here a list of similar orders executed/under execution by him to whom a reference may be made by Purchaser in case he considers such a reference necessary.

Sr. No.	Name of Client & Description.	Value of order	Period of supply and commissioning	Name & Address to Person to whom reference may be made
1	2	3	4	5

NAME OF FIRM _____

NAME & SIGNATURE OF TENDERER _____

DESIGNATION _____

DATE _____

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SCHEDULE ' G '

PROFORMA OF UNDERTAKING

We hereby confirm that 11 kV & 22 kV A.B.Switches offered by us against this tender are of the same design and type as have been supplied to M.S.E.D.C.L. against earlier order No. _____ dated _____ and all the type test reports thereof were approved by C.E.(Dist.) vide letter No. _____ dated _____ (copy enclosed).

We further confirm that the said type tests have been carried out at the laboratories accredited by NABL within five years prior to the date of opening of the present tender.

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ANNEXTURE-I

A) Schedule 'B'

- 1) Any test as per clause No. 8 of schedule 'A' (Technical Specification) can not be carried out at the manufacturer's works, reason should be clearly stated.
- 2) Schedule 'C' (Tender Experience)
- 3) Schedule 'G' (Proforma of Undertaking)

B) Physical Documents

- 1) Type test certificates of the offered 11 kV and 22 kV A.B. switch as per clause No.10 of Schedule 'A'.
- 2) Type test certificates of 'post insulators' as per clause No. 7.2 of Schedule 'A'.

Annexure E

SR. NO.	DESCRIPTION	QTY	MATERIAL	SPECIFICATION	
1	BASE	M.S CHANNEL	3/8"	M.S. GALVANISED 75 X 40 X 5 mm	I.S. 2062
2	BASE OF POST INSULATOR	3/16"	MC1 FORGED STEEL	AS PER SPECIFICATION	
3	POST INSULATOR	9/16"	PORCELAIN	I.S. 2544	
4	CONNECTOR	6/16"	COPPER	AS PER SPECIFICATION	
5	ARCING HORNS	6/16"	M.S. 8 MM GALVANISED	— DO —	
6	FIXED CONTACT	2 1/2"	ELECTROLYTIC HARD DRAWN COPPER	— DO —	
7	MOVING CONTACT	3/8"	— DO —	— DO —	
8	M.S SUPPORTERS STRIP WITH SPACER	3/8"	M.S. GALVANISED	I.S 2062	
9	C.I. ROLLER/C.M.S. H.D. GS.	3/8"	CASTIRON/M.S H.D.G	AS PER SPECIFICATION	
10	LOCKING ARRANGEMENT	1/1"	MILD STEEL; H.D. GALVANISED	I.S 2062	
11	OPERATING PIPE VERTICAL 6 MTR 32 MM OD, CLASS 'B'	1/1"	G1 PIPE	I.S.1239	
12	FLEXIBLE COPPER BRAIDED TAPE	3/2"	COPPER (TINNED)	AS PER SPECIFICATION	
13	OPERATING HORIZONTAL ROD, SQUARE (SOLID)	1 1/2"	G.1 25 X 25 MM SQ.	AS PER I.S.	
14	OPERATING ON/OFF HANDLE	1 1/2"			

M.D.	DISTANCE IN MM	
	11 KV	22 KV
A	750	1220
B	310	460
C	410	560
D	560	770
E	660	870

MINIM 4mm THICKNESS

NOTES —

- ALL NUT, BOLTS FOR CURRENT CARRYING PARTS SHALL BE OF STAINLESS STEEL ONLY. PLAIN & SPRING WASHERS SHALL BE PROVIDED.
- CURRENT CARRYING PARTS HAVING LOWER CURRENT DENSITY THAN THE SPECIFIED OF SAME DESIGN WILL BE ACCEPTED.
- ALL NUT BOLT WASHERS TO BE USED FOR ASSEMBLY OF NON CURRENT CARRYING PARTS SHALL BE H.D. GALVANISED.
- ALL FERROUS PARTS SHALL BE H.D. GALVANISED.
- COPPER PARTS SHALL BE HEAVILY TINNED.
- ALL DIMENSIONS ARE IN MM.
- RIVETING FOR M.S. SUPPORT SHALL BE 8/11mm.

TYPE 'A' ISOLATOR

11KV / 22KV 'A' 'B' SWITCH 400 AMPS
 GENERAL ARRANGEMENT DRAWING
 CHECKED APPROVED DATE PRG NO
 G3-72G
 SR/2 R-1

MAHARASHTRA STATE ELECTRICITY DISTRIBUTION CO. LTD.
 DISTRIBUTION SECTION

Annexure E

