

SECTION - III

TECHNICAL SPECIFICATION
OF

AB SWITCH
&
HG FUSE

1.	33 KV 200 Amp 3 Pole HG Fuse (Horizontal Mounting Type)	Quantity
		15 Sets

Technical Specification

1. **SCOPE:** - This specification covers the manufacture, testing and supply of 33 KV 200 Amps 3 pole, H.G. Fuse Sets.
2. (a) The 33 KV H.G. Fuses shall be suitable for out door operation in horizontal configuration under the climatic conditions specified. It shall be of the following ratings:-

1	Number of Poles	3
2	No.of Insulator per Pole	4 nos. 22 KV /24 KV post Insulators per phase
3	Nominal system Voltage	33 KV
4	Highest System of Voltage	36 KV
5	Rated frequency	50 Hz
6	System Frequency	Effectively earthed
7	Rated normal current	200 Amps
8	Altitudes of installation	Not exceeding 1000 M.

- (b) The post insulator used in the H.G. Fuse set shall have the following ratings :-

1	Power frequency withstand voltage (dry)	95 KV (RMS)
2	Power frequency withstand voltage (wet)	75 KV (RMS)
3	Impulse withstand voltage (dry)	170 KV (Peak)
4	Power frequency withstand voltage	1.3 times the actual dry flashover voltage of the unit

3. **STANDARDS :-**
The H.G. Fuse set shall confirm to the following standards.
IS- 9385-1980 (for high voltage expulsion fuses and similar fuses).
IS- 2544-1973 (for porecelain post insulators or its latest amendments if any.). IS- 2633-1979 (for Galvanisation of ferrous parts).
4. **INSULATOR MAKE :-** 22/24 KV post insulator complete with pedestal cap duly cemented to be used in 33 KV H.G. Fuse sets confirming to IS-2544/1973.
5. **TECHNICAL DETAILS :-** The H.G. Fuses shall have adjustable arcing horns made of solid copper rod having 8.23 mm dia. The horns shall be fitted with screwing devices with fly nuts for fixing and tightening the fuse wire. It shall have robust terminal connector of size 80 mm x 50 mm x 8 mm made of copper casting (95 % minimum copper composition) duly silver plated with two numbers of 12 mm dia brass bolts and double nuts with flat brass washers. The connectors should be capable of

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connecting crimpable conductor upto 80 Sq. mm size(ACSR/ Alloy) with bimetallic solderless sockets. The H.G Fuse Set shall suitable for horizontal mounting on sub station structures. The minimum clearance between the adjacent phases of the fuse set shall be 1200 mm and the centre to centre (distance between two post insulators of the same phase) shall be 760 mm. All metal (ferrous) parts shall be galvanized and polished. Only post insulator (original cemented and not pin insulators shall be used for the H.G. Fuse Set.

6. **CLIMATIC CONDITIONS :-** The H.G. fuse set shall be suitable for operation under the following climatic conditions.:-

1	Maximum ambient air temperature	45 ⁰ C
2	Maximum daily average air temperature	35 ⁰ C
3	Maximum yearly average ambient air temperature	30 ⁰ C
4	Maximum temperature attainable by a body exposed to the sun.	50 ⁰ C
5	Minimum ambient air temperature	0 ⁰ C
6	Maximum relative humidity	100%
7	Average number of thunderstorm days per annum	70 days
8	Average number of rainy days per annum	120
9	Average annual rain fall.	50 cm
10	Number of months of tropical monsoon conditions	4
11	Maximum wind pressure	260 Kg/mm
12	Degree of exposure to atmospheric pollution.	Normally polluted atmosphere.

- 7 **Type Test :-**

Certificate for the following type tests conducted (within five years proceeding to the date of opening of the tender) on a prototype set of H.G. Switch in a NABL approved test house/CPRI shall have to be submitted along with offer.

- i) Dielectric test (impulse & one minute wet power frequency withstand voltage test.)
- ii) Temperature rise test (for terminals)
- iii) Mechanical strength test for the post of insulator as per IS-2544/1973
- iv) Test for galvanization of metal (ferrous) parts.

8. **ROUTINE/ACCEPTANCE TESTS :-**

The inspection may be carried out by the Purchaser at any stage of manufacture. The successful bidder shall grant free access to the Purchaser's representative at a reasonable time when the work is in progress. The following routine tests shall have to be conducted on each set and results are to be furnished for consideration of deputing inspecting officer for inspection and conduction testing of the materials at the works of the manufacturer. the supplier shall give fifteen days advance intimation to the Purchaser to enable him to depute his representative for witnessing the tests.

- i) Power frequency voltage dry test
- ii) Dimension Check
- iii) Galvanization test.

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9. **Guaranteed Technical Particulars :**

The bidders are required to furnish the guaranteed technical particulars duly filed in the proforma along with the bid.

10. **Completeness of Equipment :**

Any fittings accessories or apparatus which may not have been specifically mentioned in this specification but which are usually necessary in equipment of similar plant shall be deemed to be included in the specification and shall be supplied by the bidder without extra charge. All plant and equipment shall be complete in all details whether such details are mentioned in the specification or not.

11. **Inspection :**

Routine and acceptance test shall be conducted at the place of manufacturer. The bidders are requested to furnish details of equipments which will be used for testing along with the bid. The bids of these manufacturers who do not have adequate testing facilities for conducting routine and acceptance test are liable for cancellation. The successful bidder has to furnish routine test certificate and guarantee certificate for each consignment of materials to be inspected at the time of offer of materials for inspection.

**GUARANTEED TECHNICAL PARTICULARS of 33 KV 200 Amp
3 Pole HG Fuse**

Sl. No	Particulars	Requirement	Bidders offer
		33 KV ,200 Amps.3 pole H.G Fuse	
1	Maker's name & Address	To be specified by the bidder	
2	Operating voltage	33 KV	
3	No. of Post Insulators per phase	4nos. of 22KV/24 KV Post Insulators per phase	
4	Rated normal current & normal frequency	200 Amp., 50 Hz	
5	Vertical clearance from the top of insulator to mounting channel	508 mm (minimum)	
6	Height of the riser for carrying the horn.	250 mm from the cap top of insulator	
7	Post Insulators :	Reputed make . All the post insulators provided shall be of same make.	
(a)	Maker's Name & Country of Manufacture of Post Insulator		
(b)	Type of cementing	Original Cementing only.	
(c)	1 minute Power frequency withstand voltage (Dry)	95KV RMS	
(d)	1 minute Power frequency withstand voltage (wet)	75KV RMS	
(e)	Visible discharge voltage	27KV RMS	
(f)	Dry flash over voltage	95 KV	
(g)	Power frequency puncture withstand voltage	1.3 times of actual dry flash over voltage.	
(h)	Creepage distance	430 mm(minimum). Actual creepage distance for which type test has been conducted is to be supplied.	
8.	Impulse withstand voltage for positive & negative polarity (1.2/50 micro second wave)		
(a)	Across the isolating distance	195KV (Peak)	
(b)	To earth & between poles	170KV (Peak)	
9.	One minute Power frequency withstand voltage		
(a)	Across the Isolating distance	100KV(RMS)	

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(b)	To earth & between poles	75KV(RMS)	
10	1.2/50 microsecond wave impulse flash over voltage	To be specified by the bidder	
11	Details of Arcing Horn	1' SWG (8.23 mm) copper rod silver plated provided with screwing arrangement on the fuse carrier made of copper casting for fixing fuse wire (Total length -995 mm). All the bolts, Nuts and washers should be made out of Brass.	
12	Riser Unit (250 mm height total)	a) Riser cum Connector made out of copper casting (with minimum 95% copper composition having riser size (80 mmx50mmx8 mm) and connector of size (80 mmx50mmx8 mm) duly silver plated and machine finishing provided with 2 nos. 12 mm dia. brass bolts and double brass nuts with flat brass washers and 2 nos. solderless bimetallic socket per each connector suitable upto 80 mm ² conductor. The sockets shall be preferably of "Usha Martin" make.	
		b) 170 mm height G.I Riser made of 25 mm nominal bore medium gauge G.I pipe welded with 2 nos. of G.I flat of 35mmx5mm of both ends fixed with 10mm dia. stainless steel bolts and nuts with flat & stainless steel spring washer.	
13.	Galvanization	a) All ferrous parts shall be hot-dipped Galvanized as per IS.2629/1985 (Latest Amendment)	
		b) The pipe shall be galvanized as per IS-4736/1968(Latest Amendment)	
14	Supporting Channel	100mmx50mm M.S.Channel. (Hot dip galvanized)	
15	Weight of each pole	50 Kg (Approximately)	
16	Detailed drawing submitted ?	To be provided by bidders	
N.B	i) Ferrous parts shall be duly galvanized as per IS :2629/1985(1 st . Revision), (Amendment-2) and non-ferrous parts shall be silver plated.		
	ii) Certificate from a Government approved laboratory regarding composition of copper in electrolytic copper casting of materials should be submitted during inspection of materials at the cost of tenderer.		
	iii) Items not covered in the G.T.P, but relevant in Design, manufacturing, quality control & testing of materials shall be governed by the relevant IS with latest Amendment.		

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2 i)	11KV 2 pole 200 Amp AB Switch (Horizontal Mounting Type)	Quantity
		15 sets
ii)	11KV 3 pole 200 Amp AB Switch (Horizontal Mounting Type)	Quantity
		90 Sets

Technical Specification

1. Scope: -

This specification covers manufacturing testing and supply of 11KV 200 AMPS 50HZ Air Break switches for out door installation in horizontal configuration. The switches are suitable for operation under off load conditions only and are intended for use on Distribution Sub – stations and tapping sectionalizing points of 11 KV lines.

2. Description of the materials: -

The 11KV A.B. Switch sets shall confirm to the following parameters: -

- | | |
|--------------------------------------|------------------------|
| a) Number of poles | 2 / 3 |
| b) Number of Post insulator per pole | 2nos12KVpostinsulator. |
| c) Nominal system voltage | 11KV |
| d) Highest system voltage | 12KV |
| e) Rated frequency | 50Hz |
| f) System earthing | effectively earthed. |
| g) Rated nominal current | 200 amps |
| h) Altitude of installation | Not exceeding1000M |

The post insulators used in the A.B. Switches shall have the following ratings :-

- | | |
|--|------------|
| a) Power frequency withstand voltage (dry) | 25KV (RMS) |
| b) Power frequency withstand voltage(wet) | 35KV (RMS) |
| c) Impulse withstand voltage(dry) | 75KV |
| d) Power frequency puncture withstand | 1.3 |

3. Standards: -

The AB Switch Set shall conform to the following standards: -

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- a) IS-9920 (Part-I to V)
- b) IS-2544/1973 (for porcelain post insulators)
- c) IS-2633, (for galvanization of ferrous parts.) or its latest amendments if any.

4. Insulator make: -

12KV post insulators complete with post and cap duly cemented to be used in the AB Switch Set conforming to IS-2544/1973.

The bidder shall furnish the type test certificate of the post insulators from their manufacturer for reference and scrutiny.

The bidder shall mention make, type of insulation materials, metal fittings, Creepage distance, protected Creepage distance, tensile Strength, compressing strength, torsion strength and cantilever strength.

5. Climatic condition: -

The A.B. Switch set shall be suitable for operation under the following climatic conditions.

a) Maximum ambient air temperature	45 ° C	
b) Maximum daily average air temperature		35 ° C
c) Maximum yearly average ambient air temperature	30 ° C	
d) Maximum temperature attainably by a body		
e) Exposed to the Sun.	50 ° C	
f) Minimum ambient air temperature	0 ° C	
g) Maximum relative humidity	100%	
h) Minimum number of rainy days per annum	70	
i) Average number of rainy days per annum	120	
j) Average annual rain fall	150cm.	
k) Number of months of tropical monsoon conditions	4	
l) Maximum wind pressure		260Kg./mm ²
m) Degree of exposure to atmospheric pollution	normally	
n) Atmosphere.	Polluted.	

6. Other technical details: -

- 6.1 General: - The 11KV A.B. Switch Set shall be the gang operated rotating single air break type having 2 post insulators per phase. The operating mechanism shall be suitable for manual operation from the ground level and shall be so designed that all the three phases shall open or close simultaneously. The Switches shall be robust in construction, easy in operation and shall be protected against over travel or staining that might adversely affect any of its parts. The required base M.S. Channel (hot dip galvanized) phase coupling rod, operation rod with intermediate guide braided with flexible electrolytic copper, tail piece of required current carrying capacity and operation mechanism with 'ON' & 'OFF'

positions shall be provided. The operation rod shall be medium gage of 32mm diameter nominal bore G.I. pipe single length 6 meters. The phase coupling rod for gang operation shall be of medium gauge 25 mm dia. nominal bore G.I pipe . The Rating post insulators shall be provide with suitable bearing mounted on a base channel with 8mm dia thrust collar and 6mm split pin made out of stainless steel. The operating down rod shall be coupled to the spindle (minimum) dia – 32mm for gang operation through another suitable bearing by two numbers 10mm dia stainless steel bolts with double nuts. All the bearings shall be provided with grease nipple. All metal (ferrous) parts shall be galvanized an polished. The pipe shall be galvanized in accordance with IS-4736/1968. The post insulators should be fixed with the base channel using Galvanized Nuts and Bolts.

- 6.2. Mounting:- The A.B. Switches shall be suitable for horizontal mounting in double pole sub-station structures. MS Galvanized base Channel & base support channel should be of min. size 75x40x6 mm.
- 6.3. Switching Blades: - It shall be made out of electrolytic copper with silver plated. The approximate size shall be 220mm X 50X 6 mm. The Switch shall have such a spring mechanism so as to ensure that the speed of the opening of contact is independent of speed of manual operation.
- 6.4. Fixed Contracts: - The fixed Jaw type female contracts shall be made of electrolytic copper (minimum 95% copper composition) duly silver coated controlled by stainless steel high pressure spring housed in robust G.I. Cover.
It is essential that provision shall be made in fixed female contracts to take the shock arising from the closing of move contract blade without the same being transmitted to the post insulator. The arrangement made in this regard shall be specifically shown in the drawing.
- 6.5 Arcing Horn: - As the switches are generally meant for isolating transmission line and distribution transformers, suitable arcing horns shall be provided for breaking the charging current horn shall be made of 10mm dia G.I. Rod with spring assisted operation.
- 3.5 Terminal Connectors: - Terminal connectors shall be robust in design. The size of fixed connector shall be (80 X 50 X 6 mm) and size of movable connector shall be of (80 X 50) X (80 X 50) X 6 mm of copper casting with uniform machine finishing duly silver plated made out of minimum 95% copper composition with 2 nos. 12mm dia holes provided with suitable brass bolts and double nuts, flat washers & 2nos. bimetallic solder less sockets suitable upto 80 mm² conductor.
- 3.5 Spacing: - The minimum clearance between phases to the switch shall be 760mm. The operation down rod shall be at a transverse distance of 300mm from the outer limb of the switch. The centre spacing between two post insulator sof the same phase shall be 380mm. In the open position of the A.B. switches the moving blade shall rotate through 90 °. This shall be exhibited in the drawing.

3.5 Sample, Drawing & Literatures: - Sample of each items 11KV 200 amps. A.B. Switch shall be furnished and three copies of drawings item similar to the sample shall be furnished along with the tender.

3.5 The details of construction and materials of different parts of the A.B. Switch shall clearly be indicate in the tender and illustrative pamphlet / literature for the same shall be submitted along with the tender.

7.0 **TEST & TEST CERTIFICATE:** -

7.1 Type Test: - Certificate for the following type tests conducted (within five years proceeding to the date of opening of the tender) on a prototype set of A.B. Switch in a NABL approved test house/CPRI shall have to be submitted along with offer.

Dielectric Test (impulse and one minute were power frequency withstand voltage test.)

- Temperature rise test (for contracts and terminals)
- Shorts Time current and peak withstand current test.
- Mainly active load breaking capacity test.
- Transformer off-load breaking capacity test.
- Line charging breaking capacity test.
- Cable charging breaking test.
- Operation and mechanical endurance test.
- Mechanical strength test for post insulator, as per IS-2444/1937 shall be furnished.
- Test for galvanization of metal (ferrous) parts.

7.2 Routine /Acceptance Test: -

The inspection may be carried out by the Purchaser at any stage of manufacture. The successful bidder shall grant free access to the Purchaser's representative at a reasonable time when the work is in progress. The following routine tests shall have to be conducted on each set and results are to be furnished for consideration of deputing inspecting officer for inspection and conduction testing of the materials at the works of the manufacturer. the supplier shall give fifteen days advance intimation to the Purchaser to enable him to depute his representative for witnessing the tests.

1. Power frequency voltage dry test.
2. Measurement of resistance of main circuit.
3. Tests to prove satisfactory operation.
4. Dimension Check
5. Galvanization test.
6. Operational test.

8.0 Guaranteed Technical Particulars: -

The bidder shall furnish the guaranteed technical particular duly filled in the format along with the tender.

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9.0 Completeness of Equipment: -

All fittings, accessories of apparatus which may not have been specifically mentioned in this specification but which are usual or necessary in equipment of similar plat shall be deemed to be included in the specification and shall be supplied by the Tender without extra charge. All plant and equipment shall be completed in all details whether such details are mentioned in the specification or not.

**GUARANTEED TECHNICAL PARTICULARS of 11 KV 200 Amp
AB Switch (2 pole / 3 pole)**

Sl. No	Particulars	Requirement	Bidders offer
	2i)	11KV 200Amp 2Pole AB Switch	
	ii)	11KV 200Amp 3Pole AB Switch	
1	Maker's name & Address	To be specified by the bidder	
2	Type of Switch	Rotating Type	
3	Suitable for mounting	Horizontal only	
4	No. of Post Insulators per phase	2nos. of 12KV Post Insulators as per IS:2544/73 per phase	
5	Post Insulators :	Reputed make . All the post insulators provided shall be of same make.	
(a)	Maker's Name & Country of Manufacture of Post Insulator		
(b)	Type of cementing	Original Cementing only.	
(c)	Power frequency withstand voltage (Dry)	35KV RMS	
(d)	One minute Power frequency withstand voltage (wet)	35KV RMS	
(e)	Visible discharge voltage	9KV RMS	
(f)	Dry flash over voltage	85 KV	
(g)	Power frequency puncture withstand voltage	1.3 times of actual dry flash over voltage.	
(h)	Creepage distance	230 mm. However the actual creepage distance for which type test has been conducted is to be supplied.	
6.	Impulse withstand voltage for positive & negative polarity (1.2/50 micro second wave)		

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(a)	Across the isolating distance	85KV Peak	
(b)	To earth & between poles	75KV Peak	
7.	Rated one minute Power frequency withstand voltage		
(a)	Across the Isolating distance	32KV(RMS)	
(b)	To earth & between poles	28KV(RMS)	
8(a)	Rated voltage nominal/maximum	11/12KV	
(b)	Rated normal current and rated frequency	200 Amps. 50hz	
9	Rated short-circuit making capacity	25KA (Peak)	
10	Rated Short-time current	20KA(rms)	
11	Rated peak withstand current	50KA(Peak)	
12	Minimum clearance between adjacent phase		
(a)	Switch closed (center to center)	760 mm	
(b)	Switch opened (Center of post insulator to the edge of the blade)	380 mm	
13	<u>Temperature rise:</u> The Temperature rise should not exceed the maximum limit as specified at an ambient temperature not exceeding 40°C	65 ⁰ C	
	Copper contacts silver faced terminal of switch intended to be conducted to external conductor by bolts or screws at an ambient temperature should not exceed.	50 ⁰ C	
14	Vertical clearance from top of insulator cap to mounting channel	254 mm	
15	Type of connect	a) Self aligned high pressure jaw type fixed contacts of electrolytic copper of size 70x35x6 mm duly silver plated .Each contact should be riveted with three nos. copper rivets with a bunch of copper strips /foil suitable to give desired spring action. Jaw assemblies are to be bolted through brass bolts and nuts with	

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		<p>washer.</p> <p>b) Solid rectangular blade type moving contact of size 50X6 mm and length 220 mm duly silver plated.</p> <p>c) Pressure springs are to be used in each jaw contacts should be phosphorous bronze having 8nos. of turns X28mm heights X14.4mm diameter with 14 SWG wire .</p>															
16		<p>Terminal connector for both movable and fixed should be of copper casting (minimum 95 % copper composition). The fixed connector shall be of size (65x35x6 mm and the size of the movable connector(65x35)x(65x35)x6 mm with machine finishing duly silver plated with 2 nos. 12 mm dia. hole with suitable brass bolts and double nuts with brass flat washer and 2 nos. solderless bimettalic sockets per each connector suitable to 55 mm² conductor. The sockets shall be preferably of “Usha Martin” make.</p>															
17	Moving Contact supporting angle	<p>Movable contact is to be supported by G.I Angle of size 45x45x5 mm on each phase and the moving contact are to be bolted through 2 nos. stainless flat and spring washers suitably.</p>															
18.	Galvanization	<p>a) Iron parts are hot dip Galvanized as per IS.2633/1972 (Latest Amendment)</p>															
		<p>b) b)The pipe is galvanized as per IS-4736/1968(Latest Amendment)</p>															
19	Details of Phase:																
	a) Coupling Rod	25mm nominal bore G.I.Pipe medium gauge.															
	b) Operating Rod	32mm nominal bore G.I.Pipe medium gauge single length 6meters.															
		<table border="1"> <thead> <tr> <th rowspan="2">Nominal</th> <th colspan="2">Outside Dia. in mm</th> <th rowspan="2">Wall thickness</th> </tr> <tr> <th>Max.</th> <th>Min.</th> </tr> </thead> <tbody> <tr> <td>25 mm</td> <td>34.2</td> <td>33.3</td> <td>3.25</td> </tr> <tr> <td>32 mm</td> <td>42.9</td> <td>42</td> <td>3.25</td> </tr> </tbody> </table>	Nominal	Outside Dia. in mm		Wall thickness	Max.	Min.	25 mm	34.2	33.3	3.25	32 mm	42.9	42	3.25	
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	Max.	Min.															
25 mm	34.2	33.3	3.25														
32 mm	42.9	42	3.25														

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	c) Arching Horn	8 mm dia G.I.Rod with springy action	
	d) Bearing System	One bearing shall be provided near the base channel to assist in operation.	
	e) Force of fixed contact spring	50 to 75lb	
	f) Bearings	3nos self lubricating bearing is provided with grease nipple and axial thrust bearing arrangement	
	g) Locking Arrangement	Pad Lock and key arrangement at both "ON & OFF" position..	
	h) Earth terminal	Provided at base channel at opposite ends.	
	ih)Copper braided flexible tapes	320mm long 2no. tin coated copper braided flexible tape both end seated with cupper sheets duly punched for fixing	
	j)Quick break device	Lever mechanism	
	k) 'T' connector	The 'T' connector provided on the channel having 'Moving Contact' shall be of G.I Nut & Bolt at the bottom end to facilitate replacement of this unit only during requirement and avoid entire change of the arm.	
	l) I-Bolt	The 'I-Bolt'" shall be longer with 75 mm thread.	
20	Supporting Channel	75mmx40mm M.S.Channel. (Hot dip galvanized)	
21	Weight of each pole	20 Kg (Approximately)	
22	Detailed drawing submitted ?	To be provided by bidders	
N.B	i) Ferrous parts shall be duely galvanized as per IS :2629/1985(1 st . Revision), (Amendment-2) and non-ferrous parts shall be silver plated.		
	ii) The G.I pipes and rods shall be galvanized as per IS:4736/1968(1 st . Revision), (Amendment-1) for hot-dipped zink coating on M.S. Tube.		
	iii) Certificate from a Government approved laboratory regarding composition of copper in electrolytic copper casting of materials should be submitted during inspection of materials at the cost of tenderer.		
	iv) Items not covered in the G.T.P, but relevant in Design, manufacturing, quality control & testing of materials shall be governed by the relevant IS with latest Amendment.		

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3 i)	11 KV 2 pole 200 Amp. H.G fuse	Quantity
		15 Sets
ii)	11 KV 3 pole 200 Amp. H.G fuse	Quantity
		65 Sets

Technical Specifications

1. **SCOPE:-** This specification covers the manufacture, testing and supply of 11 KV, 200 Amps 2 pole, H.G. Fuse Sets and 3 pole, H.G. Fuse Sets.
2. (a) The 11 KV H.G. Fuses shall be suitable for out door operation in horizontal configuration under the climatic conditions specified. It shall be of the following ratings:-

1	Number of Poles	2 / 3
2	No. of Insulator per Pole	2 nos. 12 KV post Insulators
3	Nominal system Voltage	11 KV
4	Highest System of Voltage	12 KV
5	Rated frequency	50 Hz
6	System Frequency	Effectively earthed
7	Rated normal current	200 Amps
8	Altitudes of installation	Not exceeding 1000 M.

- (b) The post insulator used in the H.G. Fuse set shall have the following ratings :-

1	Power frequency withstand voltage (dry)	33 KV (RMS)
2	Power frequency withstand voltage (wet)	35 KV (RMS)
3	Impulse withstand voltage (dry)	75 KV (Peak)
4	Power frequency withstand voltage	1.3 times the actual dry flashover voltage of the unit

3. **STANDARDS :-**

The H.G. Fuse set shall conform to the following standards.
 IS- 9385-1980 (for high voltage expulsion fuses and similar fuses).
 IS- 2544-1973 (for porcelain post insulators or its latest amendments if any.). IS- 2633-1979 (for Galvanisation of ferrous parts).

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4. **INSULATOR MAKE :-** 12 KV post insulator complete with pedestal cap duly cemented to be used in 11 KV H.G. Fuse sets confirming to IS-2544/1973.
5. **TECHNICAL DETAILS :-** The H.G. Fuses shall have adjustable arcing horns made of solid copper rod having 7.62 mm dia. The horns shall be fitted with screwing devices with flynuts for fixing and tightening the fuse wire. It shall have robust terminal connectors of size 80 mm x 50 mm x 6 mm made of copper casting (95 % minimum copper composition) duly silver plated with two numbers of 12 mm dia brass bolts and double nuts with flat brass washers. The connectors should be capable of connecting crimpable conductor upto 80 Sq. mm size(ACSR/ Alloy) with bimetallic solderless sockets. The H.G Fuse Set shall suitable for horizontal mounting on sub station structures. The minimum clearance between the adjacent phases of the fuse set shall be 760 mm and the centre to centre (distance between two post insulators of the same phase) shall be 410 mm. All metal (ferrous) parts shall be galvanized and polished. Only 12 KV post insulator (original cemented and not pin insulators shall be used for the H.G. Fuse Set.
6. **CLIMATIC CONDITIONS :-** The H.G. fuse set shall be suitable for operation under the following climatic conditions.:-

1	Maximum ambient air temperature	45 ⁰ C
2	Maximum daily average air temperature	35 ⁰ C
3	Maximum yearly average ambient air temperature	30 ⁰ C
4	Maximum temperature attainable by a body exposed to the sun.	50 ⁰ C
5	Minimum ambient air temperature	0 ⁰ C
6	Maximum relative humidity	100%
7	Average number of thunderstorm days per annum	70 days
8	Average number of rainy days per annum	120
9	Average annual rain fall.	150CM
10	Number of months of tropical monsoon conditions	4
11	Maximum wind pressure	260 Kg/mm
12	Degree of exposure to atmospheric pollution.	Normally polluted atmosphere.

7 Type Test :-

Certificate for the following type tests conducted on a prototype set of HG Fuse in a NABL approved test house/CPRI shall have to be submitted along with offer.

- i) Dielectric test (impulse & one minute wet power frequency withstand voltage test.)
- ii) Temperature rise test (for terminals)
- iii) Mechanical strength test for the post of insulator as per IS-2544/1973
- iv) Test for galvanization of metal (ferrous) parts.

8. ROUTINE/ACCEPTANCE TESTS :-

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The inspection may be carried out by the Purchaser at any stage of manufacture. The successful bidder shall grant free access to the Purchaser's representative at a reasonable time when the work is in progress. The following routine tests shall have to be conducted on each set and results are to be furnished for consideration of deputed inspecting officer for inspection and conduction testing of the materials at the works of the manufacturer. the supplier shall give fifteen days advance intimation to the Purchaser to enable him to depute his representative for witnessing the tests.

- i) Power frequency voltage dry test ii)
- Dimension Check
- iii) Galvanisation test.

9. **Guaranteed Technical Particulars :**

The bidders are required to furnish the guaranteed technical particulars duly filed in the proforma along with the bid.

10. **Completeness of Equipment :**

Any fittings accessories or apparatus which may not have been specifically mentioned in this specification but which are usually necessary in equipment of similar plant shall be deemed to be included in the specification and shall be supplied by the bidder without extra charge. All plant and equipment shall be complete in all details whether such details are mentioned in the specification or not.

11. **Inspection :**

Routine and acceptance test shall be conducted at the place of manufacturer. The bidders are requested to furnish details of equipments which will be used for testing along with the bid. The bids of these manufacturers who do not have adequate testing facilities for conducting routine and acceptance test are liable for cancellation. The successful bidder has to furnish routine test certificate and guarantee certificate for each consignment of materials to be inspected at the time of offer of materials for inspection.

GUARANTEED TECHNICAL PARTICULARS of 11 KV 200Amp HG Fuse (2 pole / 3 pole)

Sl. No	Particulars	Requirement	Bidders offer
	3 i)	11 KV ,200 Amps.2 pole H.G Fuse.	
	ii)	11 KV ,200 Amps.3 pole H.G Fuse.	
1	Maker's name & Address	To be specified by the bidder	
2	Operating voltage	11 KV	
3	No. of Post Insulators per phase	2 nos. of 12 KV Post Insulators per phase	
4	Rated normal current & normal frequency	200 Amp., 50 Hz	
5	Vertical clearance from the top of insulator to mounting channel	254 mm (minimum)	
6	Height of the riser for carrying the horn.	150 mm from the cap top of insulator	
7	Post Insulators :	Reputed make . All the post insulators provided shall be of same make.	
(a)	Maker's Name & Country of Manufacture of Post Insulator		
(b)	Type of cementing	Original Cementing only.	
(c)	1 minute Power frequency withstand voltage (Dry)	35KV RMS	
(d)	1 minute Power frequency withstand voltage (wet)	35KV RMS	
(e)	Visible discharge voltage	9KV RMS	
(f)	Dry flash over voltage	85 KV	
(g)	Power frequency puncture withstand voltage	1.3 times of actual dry flash over voltage.	
(h)	Creepage distance	270 mm(minimum). Actual creepage distance for which type test has been conducted is to be supplied.	
8.	Impulse withstand voltage for positive & negative polarity (1.2/50 micro second wave)		
(a)	Across the isolating distance	85KV (Peak)	
(b)	To earth & between poles	75KV (Peak)	

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9.	One minute Power frequency withstand voltage		
(a)	Across the Isolating distance	32KV(RMS)	
(b)	To earth & between poles	28KV(RMS)	
10	Details of Arcing Horn	1' SWG (7.62 mm) copper rod silver plated provided with screwing arrangement on the fuse carrier made of copper casting for fixing fuse wire (Total length -635 mm). All the bolts, Nuts and washers should be made out of Brass.	
11	Riser Unit (150 mm height total)	a) Riser cum Connector made out of copper casting (with minimum 95% copper composition having riser size (80 mmx30mmx8 mm) and connector of size (80 mmx50mmx8 mm) duly silver plated and machine finishing provided with 2 nos.12 mm dia. brass bolts and double brass nuts with flat brass washers and 2 nos. solderless bimetallic socket per each connector suitable upto 80 mm ² conductor. The sockets shall be preferably of "Usha Martin" make. Having Catalogue No. VCEML:1.3	
		b) 100 mm height G.I Riser made of 19 mm nominal bore medium gauge G.I pipe welded with 2 nos. of G.I flat of 30mmx5mm of both ends fixed with 10mm dia. stainless steel bolts and nuts with flat & stainless steel spring washer.	
13.	Galvanization	a) All ferrous parts shall be hot-dipped Galvanized as per IS.2629/1985 (Latest Amendment)	
		b)The pipe shall be galvanized as per IS-4736/1968(Latest Amendment)	
14	Supporting Channel	75mmx40mm M.S.Channel. (Hot dip galvanized)	
15	Weight of each pole	16 Kg (Approximately)	
16	Detailed drawing submitted ?	To be provided by bidders	
N.B	i) Ferrous parts shall be duely galvanized as per IS :2629/1985(1 st . Revision), (Amendment-2) and non-ferrous parts shall be silver plated.		

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	ii) Certificate from a Government approved laboratory regarding composition of copper in Electrolytic copper casting of materials should be submitted during inspection of materials at the cost of tenderer.
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Name & Signature of Tenderer with seal

NOTE: -

1. If required Specific samples should be verified at Stores, Balasore for finalization of tender.
2. The Manufacturer and Authorized Dealer of reputed company shall be given priority on production of Documentary Evidence.
3. The material when ordered should be dispatched to the Stores Balasore by Road Transport.
4. Tenderer should put his signature with seal in all the above pages.
5. The undersigned reserves the right to reduce or increase the quantity at time of placing orders and right to reject any or all quotations without assigning any reason thereof.
6. Price variation clause is not allowed.

General Manager (Works)

NESCO, Balasore.

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Price Schedule

Sl. No.	Description of materials	Unit	Unit Ex-works price	Excise Duty Rs. (@%)	Sale Tax/ VAT Rs. (@%)	Freight & Insurance	Total	Entry Tax Rs. (@%)	Total Landed Price (Rs.)	Offered quantity	Total Amount in Rs.
1.	33 KV 3 pole 200 Amp. HG fuse.	Set									
2.i)	11 KV 2 pole 200 Amp. A.B switch (Horizontal Type)	Set									
ii)	11KV 3 pole 200 Amp. A.B Switch (Horizontal Type)	Set									
3 i)	11 KV 2 pole 200 Amp. H.G fuse.	Set									
ii)	11KV 3 pole 200 Amp. H.G. fuse.	Set									
4	33KV 3 pole 200 Amp A.B Switch (Horizontal Type)	Set									

**Name & Signature of the
Tenderer with seal**