

- (i) Fire Retardancy – Class 1 as per BS – 476 Part- 7
- (ii) Flame Spread - <25 as per ASTM E84
- (iii) Self-Extinguishing – UL 94 V0
- (iv) Oxygen Index Test – Min 29 as per ASTM D 2863
- (v) UV Resistance – For 1000 Hours accelerated weather test, with reduction of tensile strength of not more than 7 % exposure to UV as per ASTM G 154.
- (vi) Antistatic Property – Resistivity  $>10^6$ (More than  $10^6$ )As per ASTM D 257
- (vii) Glow Wire Test - As per IEC 60695-2-12-2000 for 960 deg C
- (viii) Moisture absorption - Max. 0.6% - 24 hrs test as per ASTM D 570/ IS 6746 Annexure K

All the Type Tests shall be carried out from Laboratories which are accredited by the National Board of Testing and Calibration Laboratories (NABL) of Govt. of India such as CPRI, ERDA, ERTL, CIPET to prove that the FRP Pultruded Sections meets the requirements of specification.

Type Test Reports conducted in manufacturers own laboratory and certified by testing institute, shall not be acceptable.

## 10.2 ROUTINE TEST:

The following routine test as outlined in clause No.4 of IS: of IS-62271-102:2003 shall be carried out by the manufacturer on each unit to check certain essential requirements.

- i) Power frequency voltage dry tests.
  - ii) Measurement of the resistance of the main circuit.
  - iii) Test to prove satisfactory operation.
  - iv) Design and Visual Check
- FRP Test Reports(Reports Get from the FRP Manufacturer)
  - i) Loading Test – Minimum 300 KG Uni. directional Load withstand Capacity for FRP and additional conc. Load of 70 Kg with a safety factor of 2 should be placed at mid span of channel and the channel should not break or crack.
  - ii) Deflection – Not occurs after loading given
  - iii) Glass Content - Min 55 %
  - viii) Oxygen Index Test – As per ASTM D 2863
  - iv) Fire Retardancy – As per Standards

**10.3 ACCEPTANCE TESTS:**

The following acceptance test shall be carried out as per of IS-62271-102:2003 on number of samples selected from the offered lot.

- (i) Visual Inspection.
- (ii) Checking of Dimensions (of all parts as per the approved drawing).
- (iii) Power frequency voltage dry test in accordance with IS-62271-102:2003
- (iv) Measurement of the resistance of the main circuit in accordance with IS-62271-102:2003.
- (v) Test to prove satisfactory operation in accordance with IS-62271-102:2003.
- (vi) Galvanizing test as per IS: 2633.
- (vii) Temperature rise test in accordance with IS-62271-102:2003 (only on one set of sample for each lot).

The temperature rise shall not exceed the maximum limit specified. The Switch shall be mounted approximately under the usual service conditions and shall be protected against undue heating or cooling. The test shall be made with the rated normal current of 400 Amps for the switch and the rated frequency of 50 cycles. The test shall be made for a period of time sufficient for temperature rise to reach a constant value (variation not to exceed 1° C(per hour).

The temperature shall be measured by means of thermocouples only.

The temperature rise measured with the above test shall not exceed, maximum, limits specified as under:-

Sr.No.	Name of part	Temperature rise limit at an ambient temperature Not exceeding in °C
1.	Silver faced/Tin Faced copper contacts	65° C/50° C
2.	Terminals of switches intended to be connected by external Conductors by screw or bolt.	65° C

- **For FRP:** FRP Manufacturer should have a facility to test channels as per load test, IS 10661 for glass content and IS 6746 for flammability test at their work.

Raw material test certificates for vinyl ester resin, glass fiber and additives used for production shall be furnished during inspection.

Acceptance test shall be conducted on FRP manufacturer premises end.

Following tests shall be carried out in presence of DISCOM representative.

- (i) Tensile Strength- as per GTP
- (ii) Flexural Test - as per GTP
- (iii) Compressive Test - as per GTP
- (iv) Visual and Dimension Test – As per Approved Drawing
- (v) Glass Content Test – Minimum 55%
- (vi) Burn and Flammability Test

#### **10.4 SAMPLE PROCEDURE FOR ACCEPTANCE TESTS:**

One sample (i.e. one set) from each 50 sets or part of it to be selected at random from offered lot for carrying out all acceptance tests mentioned above, except for temperature rise test, which is to be carried out only on 1 sample (i.e. on one set) from the offered lot.

For the offered lot, the supplier will have to submit acceptance & routine test certificate received from the original manufacturers for the Polymeric insulators and FRP channel used in the manufacture of ABEB Switches. It is preferred that insulators/FRP Channel of same make are used in one lot, However, if insulators/FRP Channel of different makes are used in one lot of ABEB Switch, then the supplier will have to submit acceptance & routine test certificates received from the respective original manufacturers for the insulators/FRP Channel used in ABEB Switches.

The supplier will have to submit chemical composition certificate from the original manufacturer for the contacts used in ABEB Switches for every lot.

All test and inspection shall be made at the place and cost of manufacturer in presence of Company's Engineer.

Although the samples selected at random by the Company at the supplier's works, have passed the specified tests and accepted; The Company reserves the right to test, the materials after receipt at the destination by arranging the testing in any of the Government approved/DISCOM laboratory. However, in the event of the samples failing in the test or the materials otherwise found defective, the supplier shall replace such materials at the destination concerned on receipt of intimation from the Company.

**11. APPROVAL OF PROTOTYPE SAMPLE:**

On receipt of firm order, the supplier has to submit drawing for the ordered material for approval and after drawing approval, the supply shall prepare and offer a prototype sample within commencement period for carrying out all the acceptance tests as mentioned in the clause No.10.3 at the supplier's works, at the cost of supplier in the presence of inspectors of purchaser. Only after specific written approval of the prototype sample from the purchaser, the supplier shall make further arrangement to manufacture and offer the first lot. If, the offered design is in accordance to the type tests, the supplier shall be exempted to carry out them again.

**12. DETAILED DRAWINGS :**

The tenderer shall submit along with his tender dimensional general arrangement drawings of the equipment's, illustrative and descriptive literature in triplicate for various items in the ABEB.

- I. Schematic diagram of the ABEB Switch
  - II. Schematic diagram of the FRP Channel
  - III. Instruction manuals
  - III. Catalogues of spares recommended with drawing to indicate each items of spares
  - IV. List of spares and special tools recommended by the supplier.
  - V. Copies of Type Test Certificates as per latest IS/IEC.
  - VIII. Actual diagram of ABEB shall be made to display on the front portion of the ABEB with all operations (Mention in drawing attached here with), so as to carry out the operations easily.
- The following should be supplied to each consignee circle/town along with the initial supply of the equipment ordered.

Signature of Tenderer

Company's Round Seal

Date:

Place:

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- a. Copies of printed and bound volumes of operation, maintenance and erection manuals in English/Gujarati along with the copies of approved drawings and type test reports etc.
- b. Sets of the manuals as above shall be supplied to DISCOM. A soft copy of the all Technical and Drawing furnished in a CD

**13. NAME PLATE:**

Each Switch and its associated accessories shall be provided with a nameplate legible and indelibly marked with at least the following information.

- I. Name of manufacturer.
- II. Type of Supply:
- III. Serial number: (GPRD-RP014/DISCOM name/Supplier name/0001)
- IV. Rated voltage:
- V. Rated current:
- VI. Rated frequency:
- VII. Rated short time current and its duration:
- VIII. Purchase Order number and date:
- IX. Month and Year of supply:
- X. Last date of completion of Guarantee period:
- XI. Rated lightening impulse withstand voltage:
- XII. Name of DISCOM:

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Annexure 'A'

GTP for supply of 11 KV Air Break Switch with Earth Blade and FRP suitable for outdoor installation.

PART-1.

GTP for 11 KV Air break switch with Earth Blade (To be confirmed by the Bidder)

Sr. No.	Particulars	Confirmation
1	11 KV Outdoor type Single pole Mounted Air Break with Earth Blade Switch shall confirming IEC 62271 -102, 2003, Class M0 & E0.with latest amendment and others, if any and as per drawing.	Yes
2	Rated system voltage – 12 KV	Yes
3	Rated frequency - 50 Hz	Yes
4	Rated Normal current - 400 Amp.	Yes
5	No. of Poles - 3	Yes
6	Rated lighting impulse withstand voltage KV (Peak): i) To switch connector and earth - 75 KV switch being in closed position. ii) Across the terminals of open switch – 85 KV disconnecter	Yes
7	Rated one minute power frequency withstand voltage: i) To switch connector and earth 28 KV ii) Across the terminals of open Switch disconnecter. 32 KV	Yes Yes
8	Rated short time withstand current One second 16 KA	Yes
9	Rated peak withstand - 40 KA current	Yes
10	Resistance of switch at 20 degree C as per with IS-62271-102:2003 with latest amendment if any.	Yes
11	Type of mounting- vertical	Yes

Signature of Tenderer

Company's Round Seal

Date:

Place:

12	<p>Fixed and moving main contacts:</p> <p>a) Female type of contacts with spring actions on either side or male type moving contacts.</p> <p>b) Material of contacts shall be of hard drawn copper grade and chemical composition of copper shall be as mentioned in col.no.8.2 of specification.</p> <p>c) Contact shall be silver/Tin plated</p> <p>d) Thickness of silver/Tin coating (min.) on contacts - 2.5 /15 micron.</p> <p>e) Current density of contact - 2 Amp. sq. mm</p> <p>f) Current carrying capacity - 400 Amps</p> <p>g) Nos. of Spring – 4 nos. per female contacts(SS type)</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>
13	<p>Terminal connection of :</p> <p>a) Type - Lug Type , long barrel, long palm with two hole @ 30 mm</p> <p>b) Material –AL.</p> <p>c) Current density - 1.25 Amp./sq.mm</p> <p>d) Current carrying capacity –Conductor Carrying Capacity.</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>
14	<p>Bus Polymeric insulator:</p> <p>a) No. of Bus Polymeric insulators per phase – 2 Nos. each of 12 KV with creepage distance of each insulator - 320 mm.</p> <p>b) Name of material to be used for manufacturing of insulator with class/grade-silicon 30%</p>	<p>Yes</p> <p>Yes</p>
15	<p>Method of galvanizing for bolts, Nuts, washers etc. (As per IS: 2633).</p> <p>All Nuts, Bolts and washers of M10 above shall be Hot Dip Galvanized of 5.6 Grade;</p> <p>All Nuts, Bolts and washers of M10 and Smaller shall be of Stainless Steel.</p>	<p>Yes</p> <p>Yes</p>

PART-2

GTP for FRP Base Channel (To be confirmed by the Bidder)

Sr. no	Parameter	Standard	Unit	Values for FRP Pultruded Section	Confirmation
1	Ultimate Tensile Strength	ASTM D 638	Psi	30000	Yes
2	Tensile Modules	ASTM D 638	Psi(10 <sup>6</sup> )	2.5	Yes
3	Flexural Strength	ASTM D 790	Psi	30000	Yes
4	Flexural Modulus	ASTM D 790	Psi(10 <sup>6</sup> )	1.6	Yes
5	Compressive Strength	ASTM D 695	PSi	30000	Yes
6	Compressive Modulus	ASTM D 695	PSi(10 <sup>6</sup> )	2.5	Yes
7	Barcol Hardness	ASTM D 2583	scale	50-65	Yes
8	Water Absorption	ASTM D 570	% max by weight	<=0.6	Yes
9	Glass Content	ASTM D 2584	%	Min 55	Yes
10	FSI (Flame Spread Index)	ASTM E- 84	(Class-A)	Less than 25	Yes
11	Dielectric Strength Radial	ASTM D 149	kv/25mm	30-45	Yes
12	Dielectric Strength Axial	ASTM D 149	kv/25mm	10 ~ 15	Yes
13	Arc Resistance	ASTM D 495	Sec	> 120	Yes
13	Oxygen Index	ASTM D 2863-2000	Sec	> 120	Yes
14	UV	ASTM G 154			Visual Appearance after 1000 Hrs. Exposure
15	Flammability	IS 6746			Low Flammability
16	Tolerance of section				75 X 40 X 6mm +/- 2mm and for thickness +/- 0.7 mm.

Signature of Tenderer

Company's Round Seal

Date:

Place:



**Annexure- 'B'**

Bidder has to enclose following documents.

Sr. No.	Particulars	Confirmation
1	List of Plant and machinery	Yes
2	list of testing facilities	Yes
3	List of orders executed/pending at least for past two years for the items offered a) With GUVNL (Formerly .....VCL) b) With purchaser other than GUVNL (Formerly .....VCL)	Yes Yes
4	Drawing No.	Yes
5	Type test details as per cl.10.1 of tender specifications	Yes
6	Chemical composition as per cl.8.2 of tender specification for copper	Yes
7	One (1) set of sample is to be submitted with tender	Yes

**Annexure 'C'**

Bidder has to mention below deviation if any, quoting relative clause of specification

Signature and Seal of Tenderer.