

TECHNICAL SPECIFICATION
FOR
Supply, installation, testing and commissioning of
Remotely Operable And Communicable 11 KV Air Break Switch With Earth
Blade
(11KV ABEB Switch)

:: TECHNICAL SPECIFICATION NO::

Sr. N o	Technical Specification No./Revision	Date of revision
1.	GUVNL/GPRD/TS/RP-008/ABEBC/R0	10/10/2018
2.		
3.		

1. SCOPE :

This specification covers manufacture, supply, installation, testing and commissioning of Remotely Operable and Communicable 11 KV Air Break Switch with the Earth Blade and the DCU with accessories to be mounted on double pole structure for out-door installation for use on various 11 KV feeders in the DISCOMs under GUVNL. The ABEBEC shall be installed on existing double pole structure or double pole structure is required to be erected by the bidder, as the case may be.

Remote operation of the switch shall be integrated with the existing desktop/mobile application, already developed by the GPRD Cell. Necessary detail of the application shall be provided to the bidder by the DISCOM.

The communication shall be established between The DCU ABEBEC and the already developed mobile/Desktop application. All the communication shall be GSM based.

It is not the intent to specify completely herein all the details of the design and construction of the remotely operable and communicable Air Break Switches with the Earth Blade and the DCU. However, ABEBEC Switches will confirm, in all respects, to a high standards of engineering design and workmanship and shall be capable of performing continuous operations, in a manner acceptable to the purchaser, who will interpret the meanings of the drawings and specifications and shall have the power to reject any material, which in his judgment, is not in accordance with the specifications/drawings related.

The ABEBEC Switches offered shall be a complete set, with its all the components necessary for its effective and trouble-free operation during its service period, along with associated equipment etc. Such components shall be deemed to be within the supplier's scope, irrespective of whether those are specifically brought out in the specification and/or in order, or not. Also, similar parts, particularly removable ones, shall be inter-changeable.

2. SCHEDULE OF REQUIREMENT :

The detailed requirement for supply, installation, testing and commissioning of 11 KV ABEBEC Switches against the specification are given in Schedule 'A'.

3. APPLICABLE STANDARDS:-

1. IS 9920 (Part 1 to 4)/1981 with latest Amendment if any.
2. IS 9921 (Parts 1 to 5) Specification for AC dis-connectors and earthing switches for voltages above 1000 V.

3. IS 2633/1986 with latest amendment if any and other relevant IS number mentioned in the specification.
4. IS 2544/1973 with latest amendment, if, any.
5. IEC: 61109 with latest amendment if any.
6. IEC60129/IEC62271-103/IS 9921 - Alternating current dis-connector (Load break isolators) and earthing switch
7. IEC 60265-1/IS 9920:1988- High voltage switches.
8. IEC 60529/IS 13947(Part-1) - Degree of protection provided by
 - i. enclosures for low voltage switchgear and
 - ii. Control gear.
9. Indian Safety Regulations 2010/Relevant IS For FPI and DCU
10. Electro-magnetic compatibility - IEC-61000-6-2 and FCC part 15
11. IP65 Protection level - IEC-60529
12. Damp Heat cycle Test (Humidity & Heat cycle - IEC-68-2-30
13. Salty fog - IEC-68-2-11
14. Sinus wave vibration & Shocks- IEC-68-2-6 , IEC-68-2-29
15. Dielectric Test - IEC 60060-1
16. Temperature aging- IEC-68-2-14
17. Short circuit - ANSI 495 (part 4.4.8)
18. EMI / EMI immunity - IEC -801
19. Device Enclosure- I P 65
20. Battery/DC Motor Standards – As per Relevant IS

The ABCEC meeting with the requirements of any other authoritative standards, which ensures equal or better quality, than the standard mentioned above as well as latest standard, shall also be acceptable. If the equipments, offered by the Bidder confirm to other standards, salient points of difference between the standards adopted and the specific standards shall be clearly brought out in the relevant schedule. In case of any difference between provisions of these standards and provisions of this specification, the provisions contained in this specification shall prevail. One copy of such standards with authentic English Translations shall be furnished along with the offer (Hard copy).

4. NORMAL SERVICE CONDITIONS :

The ABCEC Switches to be supplied against this specification shall be suitable for satisfactory continuous operations under following tropical conditions.

1. Average Ambient Air Temperature : 40° C
2. Maximum ambient air temperature : 50° C
3. Maximum air temp. in shade : 45° C

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|----|----------------------------------|--|
| 4. | Minimum air temp. in shade | : 0° C |
| 5. | Relative humidity in percentage | : 10 to 100 |
| 6. | Maximum annual rainfall | : 1500 mm |
| 7. | Wind Pressure (Max.) | : 100 Kg/n ² |
| 8. | Maximum altitude above sea level | : 1000 Meters |
| 9. | Normal climate | : Moderate hot and humid
and polluted by dust &
smoke. |

As the Gujarat state is having large area, with a long seashore having saline atmosphere, the ABEC Switches, if installed in such area, shall be able to function satisfactorily.

5. **GUARANTEED TECHNICAL PARTICULARS (G.T.P):**

The 11 KV ABEC Switches covered in this specification shall meet the guaranteed technical particulars mentioned in Annexure 'A'.

6. **The Distribution Network Electrical Parameters**

The main parameters of the distribution network are as follows:

Rated Voltage	12 KV
Nominal system voltage:	11 kV (rms)
Highest system voltage:	12 kV (rms)
Number of phases:	3
Frequency:	50 Hz
Variation in frequency:	48.5 Hz to 51.5 Hz
Type of earthing:	Solid
Power frequency withstand voltage:	28 kV
Basic impulse withstand voltage	75 kV

7. **CURRENT DENSITY:**

Current density to be adopted for all the current carrying parts of ABEC Switches, terminal connectors and Earthing Blade shall not exceed the following limits.

Copper	:	2.00 Amp. / sq.mm.
Aluminum Alloy	:	1.25 Amp. / sq.mm.
Gun Metal Base	:	1.63 Amp/mm ²

8. CONSTRUCTIONAL FEATURES:

The ABEBBC Switches shall have triple pole construction and shall be suitable for horizontal mounting For 11 KV ABEBBC Switch, there shall be 11 KV Polymeric Insulators, having minimum 320 CD.

The aforesaid channel with the AB switch shall be mounted on an M.S frame, made of two channel supports, with minimum 80 microns hot dip galvanizing. The switch shall be gang operable, manually or through motorized mechanism.

Necessary arrangements are provided at the switch for selecting the Earth position. A mechanical interlocking systems shall prevent the ABEBBC function from being operated, while operating from the "ON" to "Earth On" position without going through the "OFF" position and vice-versa of the action to 'ON' position. The metallic base of the earth blade component is solidly earthed in common, using a 50X6mm GI strip as per the drawing.

The rating of the ABEBBC shall be suitable for operation on the three phase, three wire, 11 KV, 50 cycles, A.C. System with a short-time current rating of 20KA for 3 seconds.

The Switch Shall be required to work on the both actions, i.e. remotely and manually, and in the both the ways. The switch has to have an interlock between the remote and the manual operation. For the manual operation, there shall be two provisions for operation, one –to operate through motor On/Off push button and second - through gang operated handle.

All required fabrication for mounting the switch shall be in the scope of the bidders, Drawing shall have to be got approved before production.

- 8.1 The 11 KV Polymeric Insulators to be used in manufacturing of ABEBBC Switches shall be confirming to IEC: 61109, and as mentioned therein, with the latest amendment, If any.

For 11 KV Polymeric INSULATORS: The Bidder shall submit type test reports as per IEC: 61109 from NABL Approved Laboratory, along with the bid.

The supplier will have to offer inspection of the Polymeric insulators at the works of manufacturer, before offering prototype and inspection in lot of the ABEBBCS witches, at their own cost.

8.2 The Male and female contacts of the switch shall be prepared from hard drawn copper strip as per 1897/1983 (with the latest amendment, if any). The chemical composition of copper shall be as under :

<u>Element</u>	<u>Percent</u>
1. Copper (Min.) including silver & oxygen	: 99.90
2. Bismuth (Max.)	: 00.001
3. Lead Max.	: 00.005
4. Total of all impurities excluding silver and Oxygen (Max.)	: 00.003

Further, all the ABEB contacts, must be silver plated, with thickness of a coating, not less than 2.5 Micron. The male and female contacts from electrolytic copper will have to be mounted on the Gunmetal base.

Gun Metal chemical composition shall be as per IS-10472/1983, Grade-II of Table-I and the current density of Gun Metal Base shall be 1.63 Amp/mm² min.

8.3 The spacing between the phases shall be adjustable between 450 mm to 600 mm (Minimum) for 11 KV switch.

8.4 For the fix components :

Bolts, Nuts, Washers etc. below 5/8" shall be of electro galvanized or nickel plated and for sizes 5/8" and above, shall be of hot dip galvanized in accordance with the IS: 2633 with latest amendment, if any.

8.5 The Switch shall be provided with Aluminum lug type terminal connector made of aluminum material, with the long barrel, long palm with two hole @ 30 mm and bimetallic plate, suitable as per the requirement of site conductor size.

8.6 **AB Switch with Earth Switch:**

The switch shall consist of 600 Amp fault load making/ breaking switches, each with integral fault making earth switches. The switch shall be designed with a specific design and interlocking arrangement, separating both the mechanisms: normal operation and the Earth section; to prevent the main and earth switch being switched "ON" at the same times. The switch shall have the facility for remote operation through GSM based digital

communication through DCU. Each switch shall be of the triple pole, gang operated, automatic type with quick break contacts and with earthing arrangement during switch open position.

The isolating distance between the 'OFF' and the 'ON' position in the switch shall be sufficient to withstand dielectric test as per IS/IEC, so as to have enough isolating distance for ensuring safety during the testing and operation.

- Motor Operated 12 KV, 600A switch and Earthing Switch with making capacity.
- Anti-Reflexing Handel for manual earthing.
- Termination shall be suitable for the size, up to the size of the DOG conductor.

Necessary arrangements are provided on the switch for selecting the 'Earth' position. The system interlock shall prevent the ABEBC switch functioning from being operated from the "ON" to "Earth On" position without going through the "OFF" position.

The motor mechanism and communication device must be in one metallic enclosure, it shall follow an industrialized process of manufacturing. The ABEBC and combination shall be outdoor metal enclosed type. The enclosure shall be of high thickness, high tensile steel which must be grit/short blasted, thermally sprayed with Zinc alloy, phosphate or shall follow the subsequently painted with polyurethane based powder paint. The overall paint layer thickness shall be not less than 80 microns.

The enclosure shall have two access doors; one for the operation, relay monitoring and other for the cable access. The doors shall have the locking facility to prevent the access to operating mechanism to avoid unauthorized operating of ABEBC. Also provide proper gland for access of the cable, to block avoidable things.

ABEBC Design Features

All the design features of the proposed ABEBC, as described in the supplier's bid and in the bid's reference materials, shall be fully supported by the equipment actually delivered. The key design features include those that relate to:

- Maintainability, expandability, and life span
- Ability to operate in severe outdoor environmental conditions.
- Immunity to electrical stress and disturbance.
- Acceptable insulation properties.
- Convenient Communication interconnection features.

Signature of Tenderer	Company's Round Seal	Date:	Place:
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8.7 **Wiring and Terminals:**

The wiring shall be of the high standard and shall be able to withstand the tropical weather conditions. All the wiring and terminals (including take off terminals for future automation, DC Control wiring), space for 20% Spare terminals shall be provided by the suppliers. The wiring cable must be of standard single-core non-sheathed, provided with Core marking (ferrules), stripped with non-notching tools and fitted with end sleeves, marked in accordance with the circuit diagram- with printed adhesive marking strips. All the nonmetal exposed parts shall be UV radiation protected.

The wiring shall be carried out using multi-strand copper/Aluminum conductor super flexible PVC insulated wires of 1100V Grade for AC Power, DC Control and CT circuits. Suitable and designated colored wires shall be used for phase identification and interlocking type ferrules shall be provided at both the ends of the wires, for the wire identification. The terminal shall be suitably protected to eliminate sulphating. The connections and terminal shall be able to withstand the vibrations of the operations of the switch. The terminal blocks shall be of stud type for the controls and the disconnecting link type terminals for CT leads, with suitable spring washer and lock nuts.

Flexible wires shall be used for wiring of devices mounted on moving parts, such as jerks to the Panels or panel doors. The Panel wiring shall be securely supported, neatly arranged readily accessible and connected to the equipment terminals, terminal blocks and wiring gutters. The cables shall be uniformly bunched and tied by means of PVC belts and carried in a PVC carrying through (tray).

The position of PVC carrying through and wires shall not cause any hindrance for fixing or removing relay casing, switches etc. The wire termination shall be made with solder less, crimping type of tinned copper lugs. The core identification by plastic ferrules, marked to correspond with the panel wiring diagram shall be fitted with, on both the ends of each of the wire. The ferrules shall fit tightly on the wire. The wire number shown on the wiring shall be in accordance with the IS.375.

All the wires directly connected to trip circuits of the devices shall be distinguished by addition of a red color, unlettered ferrules.

The arrangements shall be made for making easy connections to enclosure at site and wires for this purpose shall be provided and bunched inside the panel. The bus wire shall run at the top portion of the panel.

The terminal block with an isolating link, shall be provided for the bus wire. At least, a space of 20% of total terminals shall be provided as spare for further connections. The wiring shall be done for all the contacts available in the relay and other equipments and brought out to the terminal blocks for the spare contacts. The color code for wiring is preferred in the following colors.

- Voltage circuits : Red, Yellow and Blue for the phase and Black for Neutral
- CT circuits : similar to the above
- DC circuits : Grey, for the both, positive and negative
- 250V AC circuits : Black for the both, phase and neutral
- Earthing : Green

The wiring shall be in accordance to the wiring diagram for proper functioning of the connected equipment. The terminal blocks shall be of not less than 1100V grade and shall be piece-molded type, with insulation barriers.

The terminal shall hold the wires in the tight and secured position by bolts and nuts with lock washers. The terminal blocks shall be arranged in vertical formation at an inclined angle, with sufficient space between terminal blocks for the ease of wiring.

The terminals are to be marked with the terminal numbers, in accordance to the circuit diagram and terminal diagram. The terminals shall not be marked for the functional designation, and shall be of the tension spring and plug-in type.

A clear space shall be mandatorily provided in Panel, for future expansion. The dimension details of required space for enclosure, shall be as per the requirement. The bidder shall design a compact design for the enclosure. A Normal communication load will be minimum 25 watts to 80 watts. 230V AC Supply for charging of DCU battery shall be made available. The Auxiliary supply will be taken through the PT/Solar Panel/Nearby Source etc. The 12 V DC supply is required for the satisfactory operation of the system.

8.8 **Earthing:**

The ABEBEC outdoor switch shall be equipped with an earth bus, securely fixed along the ABEBEC base.

The size of the earth bus shall be made in accordance to the IEC/IS standards, with GI Strip. Necessary terminal clamps, and connectors shall be included in the scope of the supply.

All the metal parts of the switch, which are not the part of the main circuit and which can collect electric charges leading to a hazard, shall be connected to the earthing conductor, securely. Each end of the conductor shall be

terminated by M 10/equivalent quality and type of the terminal, for making connection to earth system installation.

The metallic enclosure shall be connected to the earth bus by independent copper wires. The same shall be made in accordance to the IEC/IS standards in force. The earthing wires shall be connected to the terminals with suitable clamp connectors. Soldering of the same shall not be permitted.

One no. of earthing with connecting the G.I Strip with a minimum size of (size=38mm x 3mm min.) is to be provided as per the ref IS: 3043-1987(2006).

8.9 Accessories and Spare:

Required spares and accessories shall be supplied along with the main equipment at free of the costs during guarantee period, in case of failure within guarantee period.

8.10 Motorization:

All the parts within the ABEBEC and effectively functional, shall be fitted with an appropriate size of a 12 volt DC motor mechanism and making it suitable to make it 'On 'and 'OFF' by a remote sensor device. (However, a manual mechanism shall be provided to operate switch, in case of failure/ non-working of the motor or connectivity related issues.). The switch travelling time shall not be more than 10 Sec.

Other Accessories (required with ABEBEC):-

- a) Battery & Battery Charger
- b) 4NO+4NC auxiliary contacts. (or As per Requirement)

8.11 Connectivity:

A Provision shall be made in the ABEBEC with necessary take off terminal units for automations and connectivity through DCU to mobile/desktop application. The all the ABEBEC shall be motorized type and compatible for remotely operation through DCU. All the DI's, AI's and DO's shall be provided as potential free and control contacts. Control and communication circuit shall work on 12 V DC supply.

The ABEBEC shall be provided with provisions of following minimum signals available at separate terminal box.

- Switch Open
- Switch Close
- Switch Status
- Battery Healthy Condition

8.12 Technical Specification of ABEBC

1. Nos. of Phases - 3
2. Nos. of Poles - 3
3. Rated Voltage - 12 KV
4. Operating Voltage - 11 KV
5. Rated lightning impulse withstand voltage - 75 KV
6. Rated power frequency withstand voltage - 28 KV
7. Current Carrying Capacity - 600 Amps
8. Short time rating current for 3 Seconds - 20 KA
9. Rated peak withstand current - 50 KA
10. No of operations in Short circuit - 15 Nos. (Minimum)
11. Rated operating sequence - O – 3min – CO
12. Number of mechanical/Remote operations for earthing – As per IS/IEC
13. Interlocking between 11 KV Side Switch "ON" & Earthing

8.13 DCU for Operation, Communication and control.

The DCU shall be a low power consumption unit, to be used as a gateway to link the communicable ABEBC switch for switch "on/off" to the operation application. The DCU and the motor mechanism of the ABEBC unit shall be in the same metal closure.

-A Data Concentrator interface, metal enclosure, shall act as a communication gateway between ABEBC through GSM (SMS) and the remote control center (Server) using GSM (SMS) communication.

Data Concentrator Interface Unit (DCU)

The Data Concentrator interface shall be designed to be mounted on the same M.S channel structure of the 11 AB Switch. It shall be able to interface up to ABEBC through remote command signals.

This Metal enclosure shall include all the following functional parts:

- Communication, control and operation with the ABEBC switch.
- Motor operation mechanism with the switch.
- Long range Mobile/Web base/Server interface to ABEBC for switch On/OFF.
- ABEBC communication through GSM (SMS) Modem (will be provided by successful bidder) connected to Serial port/RJ 45 of the Data concentrator.
- Communication protocol to the control center shall be provided by the bidders. (Integration with the existing server and mobile app is in the scope of the successful bidders)

- The Configuration of the Data Concentrator Unit for the GSM communication, denomination of alarms, shall be made available by the successful bidder. The ABEBEC controlling by connection of a laptop, running the configuration software to an RS232 interface, on the communication interface shall also be securely provided. The same software shall also include full diagnostic capabilities. It shall be possible to configure these parameters from a remote control center over the GSM network. Suitably power supply with battery backup arrangement, for data concentrator and GSM MODEM, shall be done by the supplier. The Battery shall have a warranty of at least 3 years & must be replaceable. A low battery alarm shall be sensed at the remote location, giving indication for replacement of the battery or the failure to the charging circuit. The battery backup duration for the DCU to run without AC supply must be of minimum 4hrs or minimum 20 Operations of the switch.
- The DCU shall enable the communication, one side with the ABEBEC, the distant data acquisition system through a long range communication medium over mobile telephone network (GSM) others via the local RS232 port.

Basic Function of the DCU

The DCU shall have to be able to store the date and time stamping of all events from ABEBEC and send all the requested events to the Control Center. This DCU shall have the facility to change the ABEBEC switch operation related setting over the remote operation.

The DCU shall be able to house a battery and a battery charger, with external AC supply.

The main board includes:

- For long range communication: Two way communication medium with its embedded modem (GSM) or one RS232 port for external communication.
- One RS232 local parameter setting port
- 6 digital inputs, for alarm information to Control application (If Required)
- Battery faults shall be reflected through the transmission by an external DCU. Also, the necessary DI/DO to impart the control command to ABEBEC switch for ON/Off Position, shall also be reflected through the DCU to the system and the mobile application.

Dielectric With stand

IEC 61010 Insulation (50 Hz/1 min.): 2 kV
EN 60-950 Impulse wave (1.2/50 μ s): 5 kV/IEC Equivalent

8.14. Desktop/Mobile Application

The Desktop/Mobile Application shall make the communication to already erected control center and developed mobile/desktop application by the GPRD Cell. The Server requirement shall be fulfilled by the R&D cell. The Desktop/Mobile application shall be capable for the bi-directional communication, with the DCU. A Provision of the Switch (On/Off) operation status and real time status of the switch, shall be made available on the mobile application. Collecting and storage of the various events data occurred at the ABEC shall be facilitated. The application shall be capable for collecting the various real time data(Switch operation, Reason, Reset, Setting etc).as per their feeder installed location, sub-division, Division, Circle, and the DISCOM. The application shall be capable for collecting all the data sent by the DCU, to the analysis tool. The users of application shall be sub-division wise.

9. QUALITY CONTROL :

The manufacturers shall assure proper quality control for the manufacture of ABEC Switch- A tolerance of $\pm 5\%$ in the dimensions is allowed except for the current carrying parts. $+5\%$ in dimensions is allowed for the current carrying parts.

The successful bidder shall invariably furnish following information along with offer/offer of inspection and testing of proto type sample.

- I. Statement giving list of important raw materials including but not limited to
 - a) Contact material
 - b) Insulation
 - c) Sealing material
 - d) Contactor, limit Switches, Motor etc. in control cabinet
 - e) Battery
 - d) DCU, Controller
 - e) Modem

Name of the sub-suppliers for the raw materials, list of the standards according to which the raw materials are tested, list of the tests normally carried out on raw materials in presence of Bidder's representative, the copies of test certificates.

- II. The information and copies of the test certificates as in (I) above, in respect of bought out accessories & raw materials.
- III. The list of areas in manufacturing process, where stage inspections are to be carried out.
- IV. Tests normally carried out for quality control and details of such tests and its Inspections.
- V. The special features provided in the equipment to make it maintenance free.
- VI. The list of testing equipments available with the Bidder for the final testing of the ABEBEC and associated combinations vis-à-vis the type, special, acceptance and routine tests specified in the relevant standards. These limitations shall be very clearly brought out in the relevant schedule i.e. the schedule of deviations from the specified test requirements. The supplier shall, within 15 days from the date of receipt of the Purchase Order, submit following information to the DISCOM.
 - a) List of raw materials as well as bought out accessories and the names of the sub-suppliers selected from those, be furnished along with the offer.
 - b) Necessary test certificates of the raw material and bought out accessories.
 - c) Quality Assurance Plan (QAP) with the hold points for DISCOM's inspection. The quality assurance plan and hold points shall be discussed between the DISCOM and supplier before the QAP is finalized.

The supplier shall submit the routine test certificates of bought out items and raw material, at the time of routine testing of the fully assembled Switches.

10. TESTING & INSPECTION:-

10.1 TYPE TEST:-

The ABEBEC switches shall be subjected to the following type tests in accordance to the clause No. 3 of IS-9920 (Part-IV)/1985. (However, this being a new product, the bidder may submit type test of 11 KV AB Switch manufactured and supplied to any of the DISCOMs under GUVNL as per the technical specification of any DISCOM.)

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- (i) Tests to prove that the temperature rise of any of the parts, must not exceed the values specified in part-2 of this standard.
- (ii) Tests to prove the capability of the switch to carry the rated peak withstand current and the rated short time current, successfully.
- (iii) Tests to verify the insulation level including withstand tests at power frequency voltages on the auxiliary equipment.
- (iv) Tests to prove satisfactory operation and the Mechanical endurance.
- (v) The type test certificate shall not be more than 7 years old as on due date of opening of the tender.
- (vi) Various tests for the battery – Air Pressure, Capacity, Vibration, High rate discharge at normal temperature, High rate discharge at low temperature, Retention of the charge, Resistance to overcharge, Life, Storage, etc.
- (vii) DC Motor Test- As per IS standard/Tech Spec requirement.

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

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

10.2 **ROUTINE TEST:**

The following routine tests, as outlined in clause No.4 of IS: 9920 (Part-4/1985) 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) Dielectric Test for DCU as per standards.
- v) Battery Life Cycle test –As per standards/Tech Specification.
- vi) Remotely operation of Switch (On/Off) through mobile/Web base application.
- vii) DC Motor Test- as per IS/IEC.

10.3 **ACCEPTANCE TESTS** :

The following acceptance test shall be carried out as per IS: 9920 (P4/1985) 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 Cl. No.4.1 of IS9920 (p-4).
- (iv) Measurement of the resistance of the main circuit in accordance with Cl.4.2 of IS: 9920 (P-4).
- (v) Test to prove satisfactory operation in accordance to Cl. No.4.3 of IS 9920 (Part-4).
- (vi) Galvanizing test as per IS: 2633.
- (vii) Temperature rise test in accordance with Cl.3.2 of IS: 9920 (Part-4) (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 600 Amps for the switch and the rated frequency of 50 cycles. The test shall be carried out for a period of time, sufficient for temperature rise to reach a constant value (variation not to exceed 1^oC (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 ^o C
1.	Silver faced copper contacts	65 ^o C
2.	Terminals of switches intended to be connected by external Conductors by screw or bolt.	65 ^o C

- (viii) Nos. of switching operation through battery –As per Tech Spec.
- (ix) Check the Battery charging /Discharging time period- as per tech Spec.
- (x) Battery Test: Physical Examination, Dimension, Marking, Air Pressure, Capacity, High rate discharge at normal temperature, High rate discharge at low temperature, Retention of charge.
- (xi) Interlock for Live contactor and Earth switch – As per Specification.
- (xii) Motor Test- Dimension, Marking, RPM, Duration for completing one operation.

For the DCU

- i) Dielectric Test for DCU as per standards
- ii) ABEBEC shall be remotely communicable and operable with control center through the Desktop/mobile application.
- iii) DCU shall be connected remotely for resetting, configuration and reconfiguration, and collection of all the requisite and required data, events etc.
- iv) Nos. of switch operation through battery –As per Tech Spec.
- v) Check the integration with existing Desktop/Mobile application- As per tech Spec.
- vi) Dimension and marking of DCU

10.4 **SAMPLE PROCEDURE FOR ACCEPTANCE TESTS:**

10% of the total lot shall be selected as sample, from each lot(or part of it) to be selected at random from the offered lot, for carrying out all the acceptance tests, as 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 the acceptance & routine test certificates, received from the original manufacturers for the Battery, Motor, Polymeric insulators and Modem used in the manufacturing of ABEBEC Switches. It is preferred that all of them are of the same make used in one lot. However, if any item, of different make is used in one lot of ABEBEC Switch, then the supplier will have to submit acceptance & routine test certificates received from the respective original manufacturers for the Motor, Modem, Battery, Polymeric Insulator etc., used in the ABEBEC Switches.

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

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

Although, the samples selected at random by the Company, at the supplier's works, it must have passed the specified tests and accepted; The Company reserves the right to test, the materials after receipt of the same at the destination by arranging the testing in any of the Government approved/DISCOM laboratory. However, in the event of the samples failing at 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 at his risk and cost.

11. APPROVAL OF PROTOTYPE SAMPLE:

On receipt of the firm order, the supplier has to submit drawing for the ordered material for approval and after approval to the drawing, the supply shall be prepared and offer a prototype sample within fifteen days 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 the inspectors nominated by the purchaser. Only after the specific written approval of the prototype sample from the purchaser, the supplier shall make further arrangement to manufacture and offer the first lot. The product is with a new concept in the market and is introduced for the first time. There may be some changes later on and also, in the acceptance tests to be carried out. The supplier shall be bound to accommodate all the requirements of the purchaser, regarding the product and its quality.

12. DETAILED DRAWINGS :

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

- I. Schematic diagram of the ABEBEC Switch with the Metal Enclosure
 - II. Schematic diagram of the MS Channel Support.
 - III. Instruction manuals
 - IV. Single line diagram of DCU's.
 - V. Catalogues of spares recommended with the related 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.
 - VI. DP structure foundation drawings of ABEBEC so that Utility will plan and carry out civil works etc.
 - VII. Dimensional drawings of each material used for item VI.
 - VIII. Actual diagram of ABEBEC with shall be made to display on the front portion of the ABEBEC with all operation (Mention in Drawing attached here with), so as to carry out the operations easily.
- The following shall be supplied to each consignee circle/town along with the initial supply of the equipment ordered.

- 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 the SE (R&D). 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.

“GPRD pilot project No-RP-008”

- a. Name of manufacturer.
- b. Type of Supply: Pilot Project supply
- c. Serial number: (GPRD-RP008/DISCOM name/Supplier name/0001)
- d. Rated voltage:
- e. Rated current:
- f. Rated frequency:
- g. Rated symmetrical breaking capacity:
- h. Rated making capacity:
- i. Rated short time current and its duration:
- j. Purchase Order number and date:
- k. Month and Year of supply:
- l. Last date of completion of Guarantee period:
- m. Rated lightning impulse withstand voltage:
- n. Name of DISCOM:

Manufacturer's Name:

And Address:

Annexure 'A'

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

PART-A.

GTP for 11 KV Air break switch with Earth Blade

Sr. No.	Particulars	Confirmation
1	11 KV Outdoor type Air Break with Earth Blade Switch shall confirming IS: 9920/1981 (part-I to IV), IS: 2633 & IS: 2544/1973 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 - 600 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 32 KV Switch disconnecter.	Yes Yes Yes
8	Rated short time withstand current three second 20 KA	Yes
9	Rated peak withstand - 50 KA current	Yes
10	Resistance of switch at 20 degree C as per cl.4.2 of IS 9920 P-4/1985 with latest amendment if any.	Yes
11	Type of mounting- Horizontal	Yes

12	<p>Fixed and moving main contacts:</p> <p>a) Female type of contacts with spring actions on either side and 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 plated</p> <p>d) Thickness of silver coating (min.) on contacts - 2.5 micron.</p> <p>e) Current density of contact - 2 Amp. sq. mm</p> <p>f) Current carrying capacity - 600 Amps</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 - Aluminum</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 creep age distance of each insulator - 320 mm.</p> <p>b) Name of material to be used for manufacturing of insulator with class/grade-silicon 43%</p>	<p>Yes</p> <p>Yes</p>
15	<p>Method of galvanizing for bolts, Nuts, washers etc.</p> <p>i) Size below 5/8" – Electro galvanized or nickel plated.</p> <p>ii) Size 5/8" and above hot dip galvanized as per IS: 2633.</p>	<p>Yes</p> <p>Yes</p>
16	<p>Motor – 12 Volt, 0.250 HP (Or As per Requirement), 1500 RMP with controller, limit switch facility- Motor shall be operated manually and remotely with the help of DCU.</p>	<p>Yes</p>
17	<p>One operation like (Switch Open or Switch close) shall be complete; one cycle through motorization within 10 Second.(On Site through Manually)</p>	<p>Yes</p>
18	<p>Remotely Desktop/Mobile Application through DCU one operation per cycle (Switch Open or Switch close) shall be complete through motorization within 60 Second.</p>	<p>Yes</p>
19	<p>If any operation done manually/Remotely than acknowledgement shall be received on Desktop/Mobile within 30 Second Time.</p>	<p>Yes</p>
20	<p>If any enquiry sent for status, than it shall be complied within 60 Second Time.</p>	<p>Yes</p>

21	A command not made effective within first 5 minutes of the delivery of the command, shall be not considered for the operation. (To avoid the mal operation)	Yes
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GTP for DCU:-

Sr. No.	Details	Specific Requirement
1	Type	Spread spectrum low power licence-free
2	Frequency	Free Band allowed in India
3	Communication media	GSM modem
4	Number of HV lines monitored per DCU	One nos. of ABEB Switch
5	Mechanical Large enclosure Small box Cabinet	Minimum Size
6	Switch On/Off Status	On/OFF status with time stamping (beginning time, ending time)
7	Switch On/Off Operation	On/OFF operation with acknowledgment time stamping (beginning time, ending time)
8	Equipment monitoring and Operable	ABEB Operate
9	DCU U battery alarm	Battery low in DCU and time stamping
10	AC supply	External AC supply Given through nearby LT Lines or Solar or Through PT
11	Inputs	4 digital inputs or whatever require
12	Outputs	4 relay outputs 220 Vac/1 A or whatever require
13	Downloading of local archive	Remote via any Desktop and Mobile application
14	Power supply	In built Battery of suitable rating
15	Operating temperature	-25°C to +70°C
16	Storage temperature	-40°C to +85°C
17	Mechanical enclosure Small box Cabinet	Mechanical enclosure Small box Cabinet as much as possible.
18	Dimensions in cm	As per requirement(Small Size Preferable)
19	Net weight in kg	As Per requirement(Try to keep low)
20	Protection level	IP 54
21	Standards	Standards
22	Vibrations and shocks test	IEC 68-2-6 and 68-2-29 or any other applicable
23	Salt spray and humidity tests	IEC 68-2-11 and 68-2-30 or any other applicable tests
24	Battery	12 Volt, 10 AH (Minimum) with minimum Size, chargeable- Full fill relevant IS standards or as per requirement.
25	Time	- Switch operation done within 60 Second and same acknowledgment received on mobile/Desktop application should not exceed 90 Second with acknowledgement.

- Battery/Motor/Modem/Controller and its relevant accessories and controller shall be in the scope of the Bidders.
- Mobile/Desktop Application shall not be in scope of the Bidders.

- Server for the pilot project shall be provide by GPRD Cell. Integration with the server and ABEC shall be in the scope of Bidders.
- Other than all items shall be in scope of bidders.

Annexure- 'C'

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 (FormerlyVCL) b) With purchaser other than GUVNL (FormerlyVCL)	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 'D'

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

Signature and Seal of Tenderer