



GUJARAT POWER RESEARCH & DEVELOPMENT CELL

GUJARAT URJA VIKAS NIGAM LTD

ABOUT US

Gujarat Power Research and Development (GPRD) Cell is a research center established by the Government of Gujarat for Gujarat Urja Vikas Nigam Limited (GUVNL) and its subsidiary Companies namely, GSECL, GETCO, DGVCL, MGVCL, UGVCL, and PGVCL.

GPRD Cell is working under Gujarat Urja Vikas Nigam Limited and funded by the Government of Gujarat through GUVNL. GUVNL is a parent Company of GSECL, GETCO, DGVCL, MGVCL, PGVCL, and UGVCL. GSECL is looking after electricity generation, GETCO is looking after transmission of electricity and DGVCL, MGVCL, PGVCL, and UGVCL are electricity distribution companies looking after the distribution, operation, and maintenance of electricity up to consumer level in Gujarat.

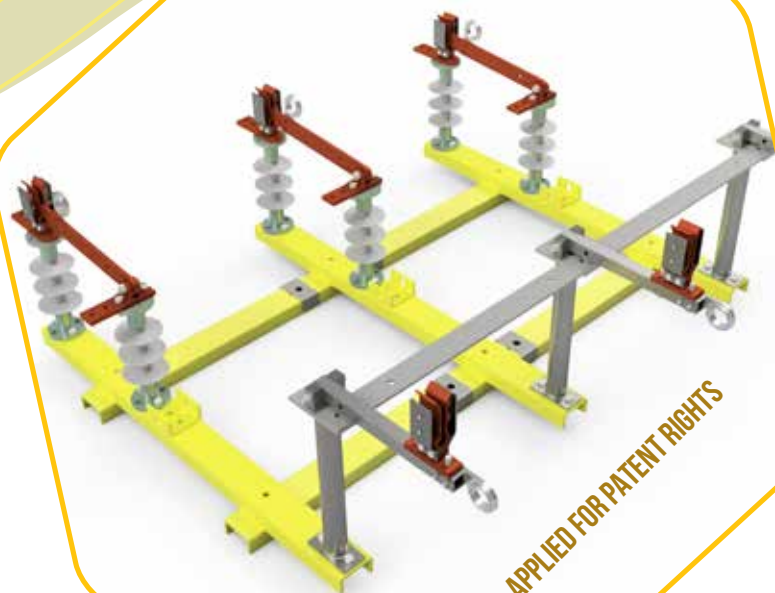
The success of the leading Companies depends on the strength of their efforts employed towards R&D. Such Companies spare and spent a huge amount of funds for R&D activities. With this concept and considering the future requirement of the power, an independent R&D Cell, called GPRD cell has been established.

As we know that the most concern issue for any of the DISCOMs is “The Earthing of the Line or Section”. Specifically, when the repair or maintenance works are going on. It is very well known that as and when it is required to work on any electric line, as a part of standard safety protocol, it is a technical requirement to earth the line solidly at both sides of the working place. It is experienced that **“If you will not earth the line, it will earth you”**

Looking to the high level of requirement of quality earthing to earth isolated line solidly at the time of repairing or maintenance works, the GPRD team has taken up the research project to address the difficulties faced by the DISCOMs by developing “AIR BREAK SWITCH WITH EARTHING(EARTH BLADE) FACILITY AND FIBER REINFORCED POLYMER(FRP) MOUNTING CHANNEL”.

AIR BREAK SWITCH WITH EARTH BLADE

(WITH FRP MOUNTING CHANNEL)



APPLIED FOR PATENT RIGHTS

CURRENT SCENARIO

It has been seen many times that due to overconfidence, unnecessary hurry, or laziness, our technical staff do not take care of such an important and essential task during maintenance works and start working on a floating line which results in a high no. of fatal/non-fatal human accidents.

When such kinds of incidents occur, ultimately the organization or company and the victims and their family members have to suffer the most by these types of irrecoverable damage. Hence working on any isolated / unearthed line is nothing less than playing with the lives only.

From Top Management to Sub-Division level, it is continuously tried for educating the line staff to ensure proper earthing of the working section before starting the work. But, it has been seen that the results achieved by us are not satisfactory. There might be so many technical as well as non-technical reasons.

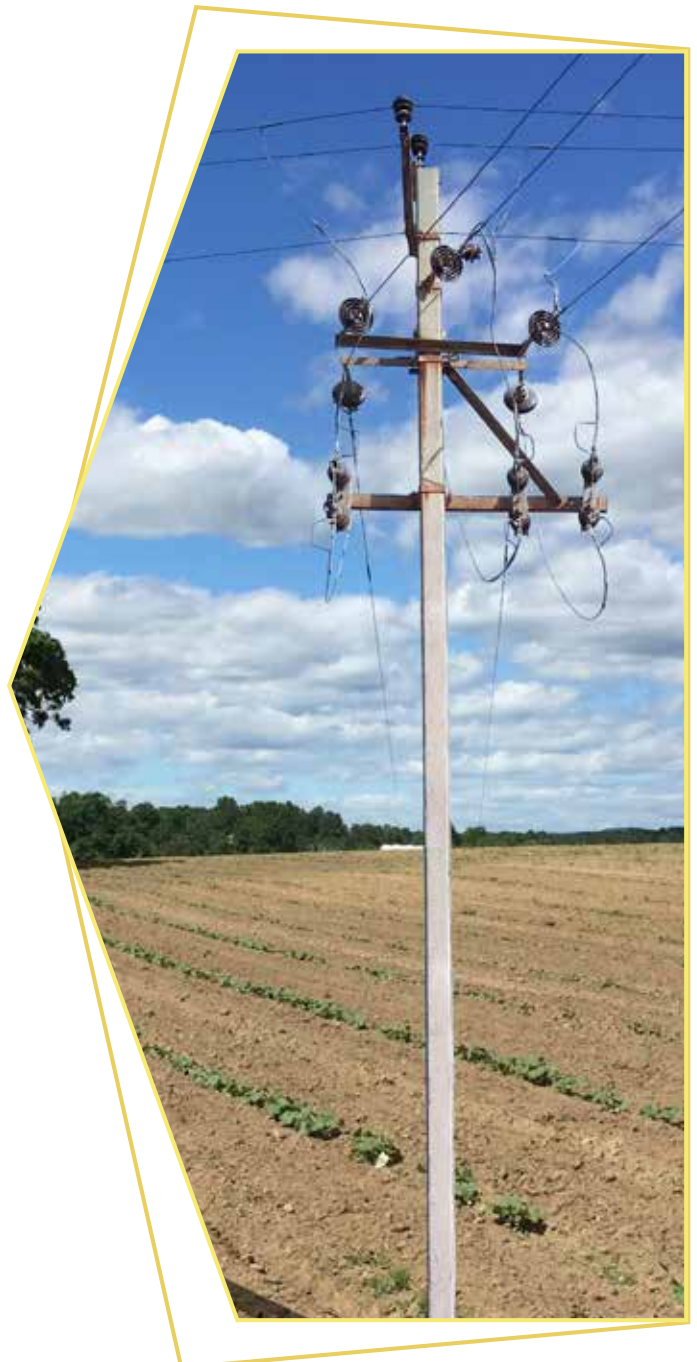
LIMITATION OF PREVAILING PRACTISE FOLLOWED BY THE DISCOMS IN EARTHING

As we know that the distribution power supply networks are the most complex one in itself. The Feeders or Lines are laid in parallel configurations. But the physical lines cross the other at many locations.

Due to parallel runs or crossings, EMF (Voltage) induces in each other (due to induction effect), and also sometimes due to low clearances, they may touch each other when conductor swings. Also, there are possibilities of back charging the line by any outsider because of the usage of generators in line without change over switch or by any other means. Under these circumstances, the line gets charged though it is isolated from the source, as it is floating (means, unearthed), it results in fatal/ nonfatal accidents. Hence it is very dangerous to work on such unearthed condition.

While working, if any isolated unearthed line touches to any live line or vice versa, the isolated line gets fully charged and the person working on the isolated line may get severe burns (Only burns or a non-fatal accident like fall from the line, or maybe fatal). In such situations, the live line does not trip immediately, due to a high resistance human body path. If such an isolated line is earthed properly, then the live line will get tripped immediately and the person working on lone will not get a heavy electric shock and may probably not meet with an accident.

Looking to the requirement of quality and perfect earthing during the maintenance work in the field to address the difficulties faced by the DISCOMs, GPRD Cell has taken up the research project as "AIR BREAK SWITCH WITH EARTHING FACILITY AND FIBER REINFORCED POLYMER (FRP) MOUNTING CHANNEL".



ABOUT “AIR BREAK SWITCH WITH EARTHING FACILITY AND FIBER REINFORCED POLYMER MOUNTING CHANNEL”

The innovative Medium voltage “AIR BREAK SWITCH WITH EARTHING FACILITY AND FIBER REINFORCED POLYMER(FRP) MOUNTING CHANNEL” design is divided into three different parts, which are known as (1) 11 KV AB Switch (2) Flexible Earthing Blade and (3) FRP Base Channel. When the (line on which work is to be carried out) is isolated by operating the ABEB Switch, by the second step the isolated line will be easily earthed by moving the flexible earthing blade, after the operation of 2nd part, all the three phases get solidly shortened and earthed, now it will become safe to work. Under certain circumstances such as when it is required to bring the power back, the choice of not operating 2nd part is available.

DELIVERING TOWARDS THE SITUATION BY “AIR BREAK SWITCH WITH EARTHING FACILITY AND FIBER REINFORCED POLYMER (FRP) MOUNTING CHANNEL”

TECHNICAL FEATURES OF ABEB

A. 11 KV AB SWITCH

The 11 kV, 600 Amp AB Switch is of outdoor type and shall be operated in ‘off’ in load condition. There shall be a change over type switch. The one side of the blade shall connect to the live line side and the other side, when operated, shall connect to the earthing side. It shall be equipped with the mechanism for operating to isolate the feeder or a part of the feeder. AB switch shall consist of the polymeric insulator with proper creepage. The insulator shall have the dry frequency high voltage withstanding capacity, minimum up to 28 kV.

B. FLEXIBLE EARTHING BLADE

The switch is provided with a manually operable, at site earthing facility. All three phases shall be solidly shortened and earthed in different and individually phase-wise operation. The device design is having a self-mechanism of not to connect the main blade with earth when it is charged. That means when the switch is in ‘ON’ condition, the earthing of the live line shall be restricted even accidentally. The Earth blade shall be operable only in the ‘OFF’ condition of the switch. In the earth side of the switch, the deadline shall get solidly earthed and that too dead short of all the three phases.

C. FRP BASE CHANNEL

FRP Channel size shall be 75 X 40 mm. FRP channel shall have a minimum length depend upon the single-pole-mounted structure and double pole-mounted structure. FRP Channel shall have the dry frequency high voltage withstanding capacity, minimum up to 28 kV. FRP Channel shall be manufactured using the PULTRUSION technology.

Glass content shall be maintained between 55% to 60% by weight in all pultruded components. Composite material shall have ultraviolet light inhibiting chemical additive to resist UV degradation. All pultruded material shall be Nexus (or equivalent) surfacing veil to provide maximum chemical and UV protection. The Composite FRP Channel shall be supplied with Drilling / Perforation and in standard length. The Channel construction shall have a high degree of finish and shall be such as to facilitate easy handling as also to ensure easy installation of ABEB Switch without causing damage. The inside surface shall be perfectly smooth and free from sharp edges, burrs or projections, etc. Only machine Moulding is acceptable on both sides. The Colour of the Channel and its accessories shall be yellow which gives good aesthetics too.



STRATEGIC ABILITY

In comparison to the present practice, the basic idea of using this ABEB is for the safety of human resources. Furthermore, the ABEB shall reduce the human effort at the network operating functions. Also, due to earthing provision in the ABEB, the safety level of utility line staff gets increased.

Even though the DISCOMs are adopting and implementing all safety measures and safety tools or equipment, the line staff’s safety issues are growing up.

The “AIR BREAK SWITCH WITH EARTHING FACILITY AND FIBER REINFORCED POLYMER (FRP) MOUNTING CHANNEL” is a new concept with the enhanced design for the inevitable safety issues faced by DISCOMs.

SOUNDLESS NATURES

- Line staff’s Electrical accidents shall get reduced
- Increase in ease and safety of the operation
- Increase the confidence of the DISCOM’s technical staff during maintenance activities
- Cost-Effective Solution
- Minimization of the fault restoration time
- Mechanically rugged design
- Address the back power issues of Distributed Generation
- Reduce Power Interruption
- Improved aesthetics
- Easy mounting

CONCLUSION

It is required to design a system that can give us a permanent technical solution facing by the DISCOM's technical staff during the maintenance activities. The line will get earthed manually without the need for any additional efforts, skill, time, and apparatus.

The "AIR BREAK SWITCH WITH EARTHING FACILITY AND FIBER REINFORCED POLYMER (FRP) MOUNTING CHANNEL" switch with earth blade facility would be more beneficial than existing equipment for various reasons. The Pilot Project shall consist of the technical features of the proposed equipment, its components, accessories, testing method, etc. The system under this design has provision for the onsite manual flexible earthing facility, without additional efforts and peripherals.



FIELD STUDY REPORT

The ABEB switch has been successfully installed, commissioned, and being monitored through a responsive platform at total 156 places of different DISCOMs. All the "AIR BREAK SWITCH WITH EARTHING FACILITY AND FIBER REINFORCED POLYMER MOUNTING CHANNEL" have been found working satisfactorily since more than 2.5 years. Field Engineers and technical staff have been giving very good reviews for the ABEB.

PATENT DETAIL

For the "AIR BREAK SWITCH WITH EARTHING FACILITY AND FIBER REINFORCED POLYMER MOUNTING CHANNEL", this Cell has already applied for the Patent which is registered by IPA no. 201821017831.

**FOR MORE DETAILS, PLEASE CONTACT US WITHOUT HESITATION,
WE ARE READY TO HEAR AND SERVE YOU AT :**



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