

LIVE WORK MAINTENANCE PRACTICES: A DESCRIPTION OF THE DIFFERENT METHODS THAT ARE USED, THE RISKS INVOLVED AND THE BENEFITS TO BE DERIVED THEREOF



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1. Introduction

Live work involves maintenance, repair, building or construction work carried out on live and operational apparatus using approved techniques and equipment. It is the preferred method of maintenance where system integrity, system reliability, and operating revenues are at a premium and removal of the circuit from service is not acceptable. Live work may also be beneficial in construction and storm damage repair. Furthermore, it is necessary and unavoidable in some cases, such as stringing over or under energized circuits or adjacent to parallel energized circuits.

2. Historical Notes

Live work is sometimes considered a recent development in the electrical power industry. However, forerunners of modern insulating tools made their appearance as far back as 1913. These initial tools were homemade, crude, and bulky; still, they launched the development of the efficient and refined tools that are used by utilities today.

These tools were first accepted for work on lines up to 34 kV; however, many linemen were hesitant to perform live work at this voltage. Because of this reluctance, many companies initially restricted live work up to 22 kV. Linemen began to acquire confidence in performing live work when they realized that the tools always kept them at a safe distance from energized parts. Restrictions were gradually relaxed, until by 1930 several utilities were permitting live work operations on 66 kV lines. The permitted voltage limit soon rose to 110 kV, and in the late 1930s the astonishing news was circulated that an American West Coast line of 220 kV had been successfully worked energized. At present live work is performed on voltages up to 765kV transmission lines.

Live work was implemented in South Africa in the early 1970s.

3. Live Working Methods

There are three basic methods that are used in live working namely Gloving, Stick and Barehand Methods.

3.1 Gloving Method

This is the method used in live working whereby live workers use insulating gloves, sleeves as their primary personal protective equipment while working on live equipment. It is applicable to Distribution voltages of up to 33kV.

Insulating blankets, line hose, barriers are used as secondary protection to prevent electrical shock should inadvertent contact with live equipment around the worker occur.

Insulating ladders, platforms pedestal mounted ladders and aerial devices are used for access.



Figure 1. Gloving Method working from an Insulating Platform



Figure 2. Gloving Method working from an Insulating Aerial Device.

3.2 Stick Method

This is the method used in live working whereby live workers at ground potential or floating maintain a specified distance from live parts and carry out their work using tools that are attached to insulating poles or sticks.

The workers rely mainly on the insulating integrity of the poles or sticks for their protection and either work from the structure or use an insulating aerial device for access.

This method is for practical purpose applicable to voltages up to 132kV.



Figure 3. Stick Method working from the structure

3.3 Barehand Method

This is the method used in live working whereby a live worker is in direct contact with energized parts and separated from ground by air and/or insulating equipment. Barehand work can be performed from an insulating ladder, insulating aerial device or helicopter.

In this method conductive clothing is used in the suit, gloves socks and boots.

This method is applicable to voltages from 66kV and more.



Figure 4. Barehand Method working from the insulating ladder

4. Risks involved in Live Working

4.1 Electrocutation.

The major risk in performing live work is electrocution. This can be caused by;

- a) Using a defective tool or equipment.
- b) Deviation from the safe work procedure.
- c) Encroaching on the safe working distance.

4.2 Height.

The other risk that live workers are exposed to is falling from heights. This can be caused by using defective access equipment such as:

- a) Ladders.
- b) Aerial device.
- c) Platforms.
- d) Fall arrest system.

NOTE: National and International Standards and Specification are available to guide us on ways to reduce these risks.

5. Benefits of Live Work

The benefits of live work are:

- a) Greater flexibility of Maintenance Management.
- b) Enhance the Quality of Power Supply.
- c) Increase the Reliability of the System.
- d) Increase the Efficiency of the System.
- e) Optimize the Generation Facility.
- f) Increase Turnover.
- g) Reduce Operating and Maintenance Costs.
- h) Increase Safety of Operation.
- i) Maintain Continuity of Service to Customers.
- j) Reduce the planned outage maintenance.

6. Conclusion

Live work has been practised in South Africa for more than 20 years. The standard of work is as anywhere in the World if not better.

The national utility (Eskom) is associated with international institutes such as EPRI (Electric Power Research Institute) for the development. This also helps the utility easily adopt new technology.

Eskom as a National Utility and its customers have benefited a lot from live working so can anyone who implements it.

7. References

Eskom Operating Regulations for High Voltage Systems – ESKARAAG4.

Eskom Standard for High Voltage Live Working – ESKASAAR9.

EPRI Live Working Application Guide – Version 1