

Safe and non-destructive Verification of Absence of Voltage (VAV) prior to maintenance works on long cable lengths, case of High Voltage cable systems

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ABSTRACT

When performing maintenance works on cable systems, e.g. check of surge voltage limiters in cross bonding cabinets, measurement of local resistance to ground, the line must be de-energised. However, in the middle of a cable system route, the identification of the de-energised line is not obvious. To ensure the worker's safety, French standard NFC 18 510, issued in 2012 [1] requires to spike the cable. This method has many drawbacks. This is the reason why the authors have developed and tested alternate non-destructive methods. These methods have been explained to the standardisation bodies and adopted in February 2023. This led to an amendment to the 2012 standard that will be soon published. In this paper, the authors tell how the non-destructive methods were tested and validated.

KEYWORDS

WORKER SAFETY, HTB VOLTAGE CONTROL, MAINTENANCE, ALTERNATIVE METHOD TO SPIKING PROCEDURE, NON-DESTRUCTIVE METHOD.

INTRODUCTION

The proposal of a method for a safe identification of a High Voltage line must be carefully checked as the worker's safety depends on its accuracy. Two methods were tested:

- Contactless injection of AC current
- In series injection of DC current

The authors report in this contribution the technical elements that were discussed and approved during the discussions of the standardisation commission AFNOR/U 21.

MOTIVATION

The present consignment procedure of High Voltage Cables systems of voltage U higher than 50 kV (so called HTB in France) requests the spiking of the cable, i.e. sectioning of the cable insulation, using a remote controlled device.



Figure 1: Example of remote controlled spiking device

The spiking procedure:

- Leads to the destruction of the main insulation of the insulated cable, including for maintenance operations that do not impact the integrity of the cable.
- only serves to identify the de-energized link. Spiking implies the installation of a joint. From the beginning of the jointing works, the spike is eliminated. It is not a safety item during the planned works.

An alternate to spiking procedure:

During operations that do not require the destruction of the cable, the following procedure can be applied:

- Inviolable grounding of the three phases of the underground link to be maintained at the overhead line compound or substation level.
- Signal injection on conductor or screen, depending on the type of work to be carried out for identification of the already grounded link.