Safe and non-destructive Verification of Absence of Voltage (VAT) prior to maintenance works on long cable lengths

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ABSTRACT

To ensure the safety of workers, the French standard (NF C 18-510) requests before any intervention on a cable system, to spike the cable, which proves that the line is not energized.

Alternatively, a non-destructive method to perform an undoubted identification of the de-energised cable is being developed. It is based on kHz range voltage injection and current detection into conductors and screens. It is the object of this paper.

A range test has been performed on a 45km long line.

A discrimination test has been performed on parallel lines.

The authors will describe the principle of the Verification of Absence of Voltage (VAT), the specificities of High Voltage transmission lines, the details and results of the performed tests.

KEYWORDS

Land Cable system, safety, maintenance.

INTRODUCTION

All works in the energy sector can be dangerous. Electricity is a powerful means to transport energy. It begins to be dangerous when voltages above 50V are involved [1].

Safety is a must have, especially in high voltage domain, where mistakes generally lead to fatal accident.

When works on a HV cable system link are close to terminations and the cable route is clearly identified, the cable conductor can be grounded at terminations (outdoor or GIS).

With the development of long insulated cable system links [2] , in most cases, terminations and cable route cannot be followed to the working area.

Most of the maintenance or repair works of a cable system do not address the main HV insulation and the power conductor but concern the oversheath and the screen connections.

To ensure the safety of workers during all these works, the French standard (NF C 18-510) requests to spike the cable which proves that the line is not energized. This destroys the cable insulation.

When the cable system must be destroyed prior to current maintenance or repair operation, safety becomes a major brake to efficiency.

The purpose of the paper is to propose a nondestructive safe and **clear identification of the link which is grounded**, conductor and screen.

This identification complements a visible grounding at the terminations, a continuity check of conductor and screen, and a local check of absence of screen current, that will not be addressed here.

DESCRIPTION OF THE IDENTIFICATION SYSTEM

The three cable conductors of the link to be identified are connected together and grounded at one end of the intervention section.

At the other end of the intervention section they are connected together, for safety reason, they must be grounded as well or a voltage limiting system must be implemented.

Inductors are placed on the 3 power cable screens grounding cables at one end.

Fig. 1: Inductors placed on screen grounding cables

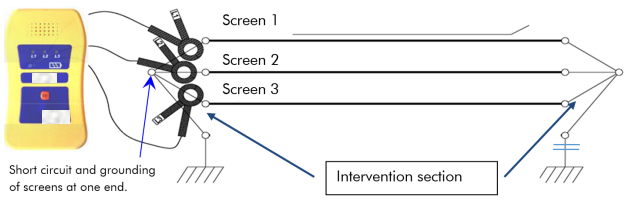

Fig. 2: Screen or conductor circuit in the intervention section