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Diagnostics and maintenance of high-pressure fluid-filled paper cable

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Abstract: The innovation presented in this paper is the description of an oil treatment method in a 225 kV 5 km long pipe type cable, live. A system for recycling the contaminated oil is connected to one end of the link, the pressure being maintained at its rated value of 15 bars by the pressurising station located at the other end. The collected oil is degassed and conveyed by lorry and re-injected into the station tank.

The main advantages of the method are to shorten the unavailability of the link, to reduce the processing costs and, compared with a total replacement by new oil, to avoid the operations regarding the used oil disposal.

Keywords : underground link, dissolved gases, pipe type cable, diagnostic

Résumé: L'innovation développée dans cet article est la description d'une méthode de traitement de l'huile d'une liaison olèostatique 225 kV longue de 5 km, sous tension. Un système de récupération de l'huile polluée est installé à une extrémité de la liaison, la pression étant maintenue à sa valeur nominale de 15 Bars par la station de pressurisation située à l'autre extrémité. L'huile recueillie est dégazée et acheminée par camion pour être ré-injectée dans la cuve de la station.

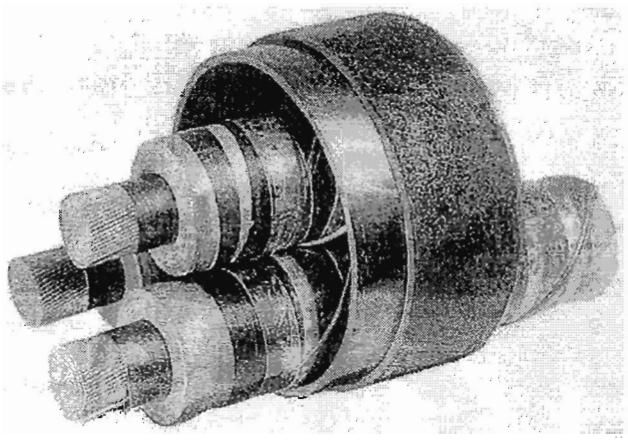
Les principaux avantages de la méthode sont de réduire la durée d'indisponibilité de la liaison, de diminuer le coût de l'opération et par rapport à un simple remplacement par de l'huile neuve, d'éviter les opérations d'élimination de l'huile usagée.

Mots Clés : liaison souterraine, gaz dissous, oléostatique, diagnostic

1 Introduction

There are more than 200 km of 225 kV pipe type cable links in the French network which are between 20 and 45 years old (installed between 1957 and 1984). These links are characterised by stationary oil station pressurised at 15 bars.

Following a breakdown of one of these links at the beginning of 2000, the network operator is questioning the remaining life of the link. Analyses on the oil show, in particular, a high hydrogen content throughout the link. This fact leads the network operator to decide to degas the oil.

The intended objective is also to obtain an overall picture of the link by regularly analysing the drained oil, then allowing a more reliable follow-up on any changes in the link by analysing the dissolved gas.

So as to reduce the costs of this operation and, above all, the unavailability of the link, the oil is collected and re-injected with the cable live. This operation is described in this paper with details on the collection , degassing and re-injection processes, the transitory hydraulic phenomena and the changes in the gas content along the link in terms of the volume of drained oil.