A4.6

Installation of 220 kV XLPE cables in a tunnel installation whilst Minimising electromagnetic induction in communication cables

GREGORY B., BICC Supertention & Subsea Cables, Erith, UK
MONTEYS J., BICC General Cables, Barcelona, Spain
BARRIS S., Enher-Hec
MENDEZ J.M., Consultant

Sommaire

11.3km de 220kV 1000mm^2 circuits à trois phases sont installées à Barcelona. Les circuits sont dimensionnés pour la transmission de 400 MVA d'énergie et sont installés dans des tunnels. Ces tunnels sont dimensionnés pour contenir, aussi bien les câbles d'énergie et de communications, que les câbles nouveaux de 220kV THT qui alimentent trois substations. En plus de la haute solidité qui est normalement associée à les systèmes de câbles THT, la proximité des câbles a demandé l'attention détaillé. Cette communication récapitule les détailles du développement de la système des câbles et les techniques utilisées pour minimiser l'ingérence entre les systèmes d'énergie et des communications.

Abstract

11.3km of 220kV 1000mm^2, three phase circuits have been installed in Barcelona. The circuits were designed to transmit 400 MVA of power and are installed in tunnels. These tunnels were designed to contain power and communication cables, including the new 220kV supertension cables which supplied three substations. In addition to the high reliability normally associated with supertension cable systems the close proximity of the communications cables required detailed attention. This paper summarises the details of the cable system development and the techniques used to assure minimal interference between the communication and power systems.

Introduction

In 1997 and 1998, 11.3km of 220kV 1000mm^2, three phase circuit was installed in Barcelona. The circuits were designed to transmit 400 MVA of power and are installed in tunnels that were built in 1992 as part of the infra-structure improvement programme for the Olympic Games.

The main tunnel is 24km long, comprising several branches, adding a further 5km. These tunnels were designed to contain power and communication cables, including the new 220kV supertension cables supplying two urban substations at Vilanova and Mata, from a peripheral substation at Saint Adria. Within the tunnel, the 220kV power cables are installed parallel to existing communication cables, spaced about 2m away, Figure 1.

In addition to the high reliability normally associated with supertension cable systems the close proximity to the communication cables required detailed attention. Thus an investigation of the prospective electromagnetic induction by the power cables and the calculation of the resulting induced voltages in the communication cables was included in the development. The investigation identified the measures needed to limit the induced voltages to the levels given in national and international standards.

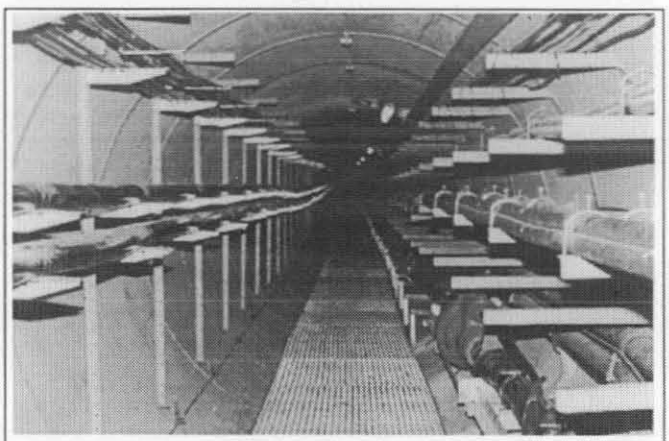

Figure 1. Tunnel containing 220kV power (with a joint at bottom right hand side), communication and service cables.

This paper summarises the details of the cable system development with particular attention to the novel theoretical approach used to ensure minimal interference between the communication and power systems.