

**A1.4****Installation of 400 kV XLPE cables in the NESAs supply area**

CHRISTENSEN P., LAGERSTEDT K., OKHOLM A., NESAs A/S, Gentofte, Denmark

**Abstract.**

This paper describes the experience gained by establishing the first 400 kV XLPE cable system in Denmark. The paper presents considerations related to the electric and thermal design of the cable system. The different techniques used during the installation process are also discussed. The last part of the paper presents two systems for supervision of the cable that is tested on the 400 kV cable system. The systems measure cable sheath temperature and current in the screen earthing point of the Cable system respectively.

**Résumé**

Cet article décrit l'expérience acquise par la mise en oeuvre de premier système de câble XLPE au Danemark. L'article traite des considérations sur la conception électrique et thermique du système de câble.

En outre, il traite des différentes techniques utilisées au cours de l'installation. La dernière partie de l'article présente deux systèmes de surveillance du câble qui ont été expérimentés sur le système de câble de 400 kV. Le système mesure respectivement la température de la gaine du câble et le courant au point de mise à la terre du système de câble.

**1. Introduction**

In the early 90's it was decided to renew the power supply to the Copenhagen area. The power supply consisted, among other lines, of several 132 kV overhead lines which were situated in densely populated areas. It was decided to remove these lines. To make this possible it was necessary to build two new 400 kV links and new 400 kV stations in the southern and northern part of the Copenhagen area. These new 400 kV links would, together with the Energy production from power stations in the Copenhagen area, give a secure power supply. [1].

The southern 400 kV link between the 400 kV station in Ishøj and a new 400 kV station at H. C. Ørsted Værket has a total length of 21 km. This link consists of two cable systems with lengths of 12 and 9 km respectively. Between the two cable systems a 400 kV coupling station in Avedøre is constructed (for later connection to a new power station). The first 17 km of this link is installed in NESAs supply area and the last 4 km is installed in the area of Copenhagen Energy.

The northern link, which is installed in the NESAs supply area, consists of a 7 km com-

bined 132 and 400 kV overhead line and a 12 km 400 kV cable.

This paper will present the experience from the installation of the southern system, which has been in operation since October 1997. This system was installed in the period from October 1995 to September 1997.

**2. Electric and Thermal Design.****Cable laying in Denmark**

Cable systems in Denmark are normally established by direct burying. The depth of the cables depends on the voltage level of the cables. For 132 kV cables the depth of laying is between 0,9 and 1,2 m.

The 400 kV cables are very rigid and it is therefore important that the cables are laid in a smooth line.

For the new 400 kV cables it was decided that a burying depth of 1,5 m would be appropriate. At this depth most of the existing lines and pipes for telephone, gas and water supply and similar pipes can pass over the cables.

A laying depth of 1,5 m will usually present a smaller risk of third party damage on the cables.