



# RENEWAL WORKS OF UNDERGROUND TRANSMISSION SYSTEM IN KEPCO



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## ABSTRACT

In this paper, we introduce the renewal works of the SCOF cable and XLPE cable of underground transmission system in the Kansai Electric Power Company (KEPCO). We also introduce our endeavour to keep reliable facilities.

## KEYWORDS

SCOF cable, XLPE cable, renewal works,

## 1. The outline of underground lines in KEPCO

The KEPCO'S underground transmission systems more than 77kV consist of 2201 lines, and its total circuit length reaches 1975km. Our transmission system is consisted of main three voltage classes, such as 77kV, 154kV, and 275kV. The 77kV transmission lines occupy about 93% of the lines and about 77% of the length. (Fig.1.)

For the underground transmission cable, the SCOF cable with lead sheath was first adopted for 77kV in 1938, and it reached higher voltage up to 275kV. The SCOF cable with aluminum sheath was adopted in 1970, and had been used generally. The XLPE cable was first adopted in 1972. Thereafter, the amount of XLPE cable has been increasing every year, the XLPE cable has exceeded that of the SCFF cable since 1982. (Fig.2.) Because the oil feeding equipment is unnecessary, the XLPE cable is easy for us to install and to maintain. Now, as almost all of the new cables are XLPE, the existing 77kV cables reaches 60% of the total.

There are three basic methods to install the cable, the conduit installation method, the tunnel installation method and the direct buried method. In comparing the two major methods excluding the costly tunnel, the conduit installation method has advantage that the replacement work or the work of the reinforcement is easier and quicker. However it has disadvantage that the metal-sheath of the cable in the manhole deteriorates due to the cable stretch from the conduit according to the load fluctuation and the soil temperature variation. In case of the direct buried method, the cable scarcely moves. Therefore, it is not necessary to consider the cracking of the cable sheath caused by the metal strain. However the renewal work is very difficult, especially in the metropolitan area. In the renewal point of view, we have adopted a conduit installation method. The conduit length is 1501km, and this length has accommodated with 72% of the cable section length.

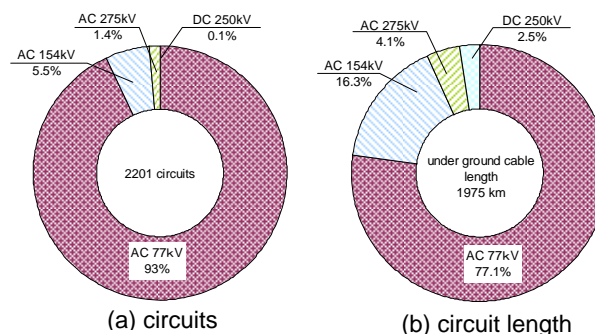


Fig.1. The proportion of the facilities in KEPCO

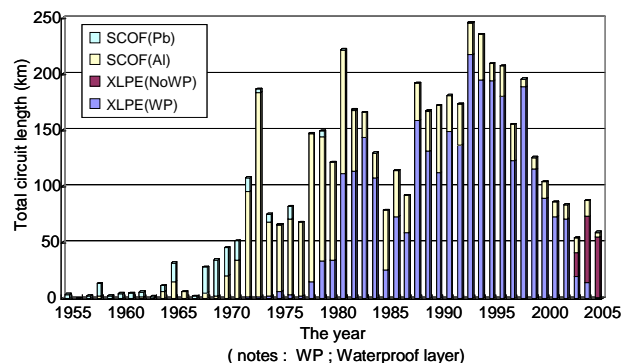


Fig.2. The amount trend of underground lines in KEPCO

## 2. Key points to renew the system

As for in KEPCO, the underground cables which are aged 30years are increasing, therefore, we have to consider the possibility of breakdowns of related facilities for various factors. Thus, for the purpose of the stable supply of electric power and effective use of existing facilities, we started the study to establish the standard of the renewal works based on the investigation of removal product and the diagnosis of deterioration. Also we are always planning that the most effective renewal of deteriorated facilities.

In KEPCO, key points to renew the underground systems are summarized as three points of the following;

1. (Long-term reliability): Estimating long-term reliability assuming that it greatly depends on the manufacturing progress, the specifications and the circumstances of each cable.
2. (Precaution measure for the similar facilities): After each trouble, checking similar facilities which might cause the same accident.