



### A9.5

## Achievements in operation of XLPE cables in Japan

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### Résumé

Les câbles XLPE deviennent de plus en plus populaires au Japon en raison de la facilité de leur installation et entretien. Ils sont utilisés comme câbles standard applicables à la capacité allant jusqu'à 275 kV. Selon le résultat de l'étude réalisée au Japon, le taux de rupture diélectrique des câbles XLPE eux-mêmes est presque identique à celui des données CIGRE. Toutefois, le taux de rupture diélectrique des terminaisons et des connexions est d'un chiffre plus petit que celui des données CIGRE. Ce bon résultat a conduit à la discussion sur l'essai de résistance à la haute tension fait sur place après l'installation du câble. Par conséquent, la Norme Technique de l'Équipement Électrique est révisée en sorte de modifier l'essai de résistance à la haute tension en septembre 1998.

### ABSTRACT

In Japan, XLPE cables are becoming more popular nowadays, due to the ease of laying and maintenance. The circuit length of XLPE cable is rapidly growing and it is used as standard cable for up to 275kV. On March 1996, circuit length of XLPE cables has reached 14,700 km and holds 69% share in total underground cables. Breakdown ratio of XLPE cables in Japan is almost the same as that of CIGRE data. That of terminations and joints is 1 digit smaller than that of CIGRE data. Because of good operating achievements, revising of completion tests has been discussed and 'power frequency withstand voltage test' was streamlined when 'Technical Standard for Electrical Equipment in Japan' was revised in Sept. 1998.

### 1. Change of Total Circuit Lengths in Japan

In Japan, three types of cable have been commonly used for underground transmission lines. They are Self Contained Oil Filled cables (SCOF), Pipe type Oil Filled cables (POF) and XLPE cables, but due to the ease of laying and maintenance, XLPE cables are becoming more and more popular nowadays. Total circuit length of underground cables in Japan rated 22kV class (including 22 and 33 kV) and over is shown in Fig.1. In March 1996, it is 21,200 km and is increasing approximate 600km a year. With respect to voltage rating, length of cables rated 66kV class (including 66 and 77 kV) has been increasing gradually. It has reached 10,300 km and holds 49% share in total underground cables in March 1996.

Change of circuit length with respect to types of cable is shown in Fig.2. Length of XLPE cables has been

increasing rapidly since 1970s, and has exceeded that of SCOF cables in 1984. In March 1996, circuit length of XLPE cables has reached 14,700 km and holds 69% share in total underground cables, which is more than twice of that of SCOF cables.

Change of the highest rated voltage of XLPE cable is shown in Fig.4. XLPE cables are now used as standard cable for up to 275kV and now long distance transmission line of rating 500kV is under construction and will be in service in 2000. And change of circuit length of XLPE cables is shown in Fig.4. Length of XLPE cables rated 66kV class has been increasing rapidly since late 1970s when joint rated 66kV class was developed. Length of XLPE cables rated 110kV and over is less, but has been increasing recently.

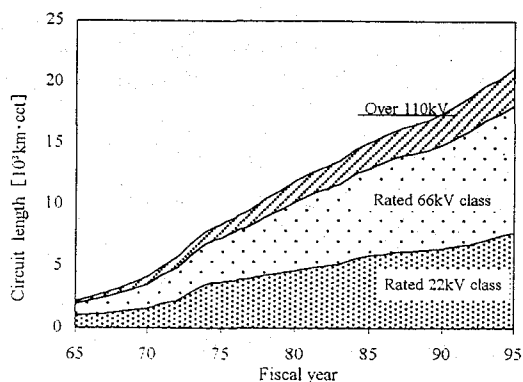


Fig.1 Total circuit length of underground cables

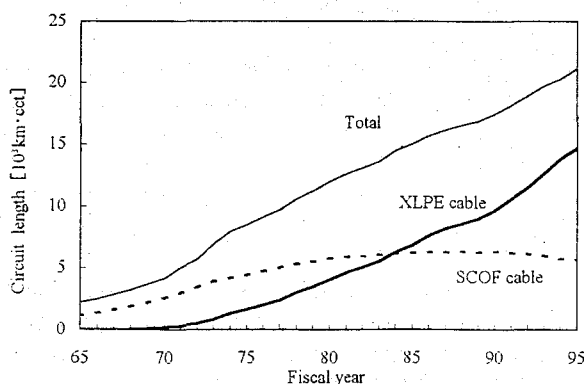


Fig.2 Total circuit length of underground cables with respect to types of cable