



### A5.2

## Development of prefabricated joint for 500 kV XLPE cable

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### Résumé

Un joint préfabriqué (PJ) pour câble XLPE 500 kV est actuellement en développement au Japon pour permettre la construction de lignes de transmission longue distance en moins de temps. Ce rapport couvre la conception d'un PJ compact, par rapport à la valeur de conception conventionnelle. Une nouvelle méthode de traitement de l'écran isolant de câble par éliminatrice automatique est également présentée, ce qui peut réduire le temps d'assemblage. Les essais de performance électrique à court terme avec assemblage d'un total de 24 joints pour le système de câbles 500 kV ont montré une excellente valeur électrique. L'essai sur terrain sera effectué comme étape finale pour confirmer la performance de vieillissement à long terme.

### 1. Introduction

Recently, service voltage of XLPE cable becomes rapidly higher and 500 kV long-distance underground transmission line is reaching at the stage of practical use[1-3]. 500 kV PJ is being developed to cope with this demand and the shorter construction period. The design concept of this PJ is to be equivalent size to 275 kV PJ. And the treatment of cable insulation screen tip is improved to shorten installation time. Therefore, it is important to study electric weak points in 275kV PJ and decrease the maximum stress in unequal electric field and/or increase the insulating strength of the materials. This paper introduces the design for compact 500 kV PJ, the installation to shorten splicing time and the program of long-term loading cyclic test.

### 2. Specification

Table.1 shows the required performance as short term electric characteristics for 500 kV PJ. The size of the PJ is less than 390 mm in diameter and 2300 mm in length, approximately 500 kg, which is almost same as that of 275 kV PJ. Figure 1 and Table 2 show cross-section and structure of the cable respectively. This cable

### Abstract

The prefabricated joint(PJ) for 500 kV XLPE cable is now under development in Japan to enable us to construct the long-distance transmission line in a shorter period. This paper reports the design of compact PJ compared with that by conventional design value. The new method to treat cable insulation screen by using an automatic eliminating machine is also presented, so that it can shorten the assembling time. A total of 24 joints are assembled for the short-term electric performance tests for 500kV cable system. These results indicate the excellent electric value. The field test will be conducted as the final stage to confirm long-term aging performance.

Table 1. Required performance

AC withstand voltage	970 kV / 1 Hr(RT)
	810 kV / 1 Hr (90°C)
Lightening impulse withstand voltage	± 1960 kV / 3 shots(RT)
	± 1570 kV / 3 shots(90°C)
Switching impulse withstand voltage	± 1130 kV / 3 shots(RT)
Partial discharge	465 kV / 10 min. no detection more than 5pc of noise (RT)
DC withstand voltage	- 955 kV / 1 Hr(RT)

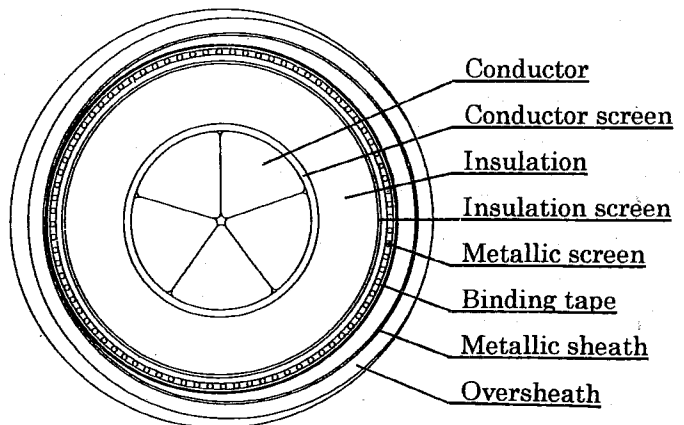


Fig.1 500 kV XLPE cable