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#### Results of after-laying tests of 275 kV XLPE cable line

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**Abstract:** In 2002, Chubu Electric Power Co., Inc. (CEPCO) completed a 275kV underground transmission line, and conducted power-frequency withstand voltage tests on the line. As a result of the tests, partial discharge was found in one phase of the 2-circuit 6-phase line about five hours after the start of application of voltage. The part in question was removed and repaired, and voltage was applied again to the part, and we confirmed that there was no problem on the line and after-laying test was effective in detection for the defects of 275kV XLPE cable. The removed part was carried to the factory and investigated in detail. As a result, a peel as thin as about 0.1 mm was found between the outer semiconducting layer of the cable and the insulator.

**Keywords:** 275kV XLPE, partial discharge

**Résumé:** En 2002, Chubu Electric Power Co. (CEPCO) a achevé l'installation d' un câble de 275 kV souterrain, appelé la ligne de Kawagoe-Nishinagoya entre la station thermique de Kawagoe et la sous-station de Nishinagoya et a effectué des essais pour vérifier la résistance du câble à la tension de fréquence commerciale. Après à peu près 5 heures de l'application de la tension d'essai, une décharge partielle est détectée sur une phase des 6 phases de 2 circuits. La zone en question est enlevée, transportée à l'usine et examinée en détail. Une écaille d'épaisseur de 0,1mm est observée entre la couche extérieure de semi-conducteur du câble et l'isolant.

**Mots clés:** 275kV PRC, décharges partielles

### 1. Introduction

CEPCO completed a 275kV XLPE cable line called the Kawagoe-nishinagoya Line between Kawagoe Thermal Power Station and Nishi-Nagoya Substation in 2002. The insulation thickness of the cable used for the line was 27 mm, and an EMJ (extrusion-molded joint) was used as a joint box. The joint is assembled in a clean room under strict quality controls. As for microscopic external defects that cannot be eliminated by quality controls, the after-laying tests, including both power-frequency withstand voltage tests and partial discharge tests, are applied to ensure the soundness of our lines. CEPCO has track records of about 1,800 phases.

This time, the after-laying tests mentioned above were conducted on the Kawagoe-Nishinagoya Line, and partial discharge that had a time delay before its occurrence was detected at a void defect of MGI (Metal-Gap-Insulator) where there supposed to be no time delay in the occurrence of partial discharge. As this phenomenon is unprecedented and represents valuable findings, we report the phenomenon together with the results of disassembling investigation.

### 2. Layout of Kawagoe-Nishi Nagoya Line Route

Figure 1 shows the route of the Kawagoe-Nishi Nagoya Line. The total length of cables is about 14.4 kilometers, linking Kawagoe Thermal Power Station

and Nishi-Nagoya Substation together. It has two circuits, all of which are installed in tunnels. The cables are connected together at five points at intervals of 2,500 meters, and the number of EMJs amounts to 30 phases. The structure of the EMJ is shown in Figure 2, and the structure of the cable is shown in Figure 3.

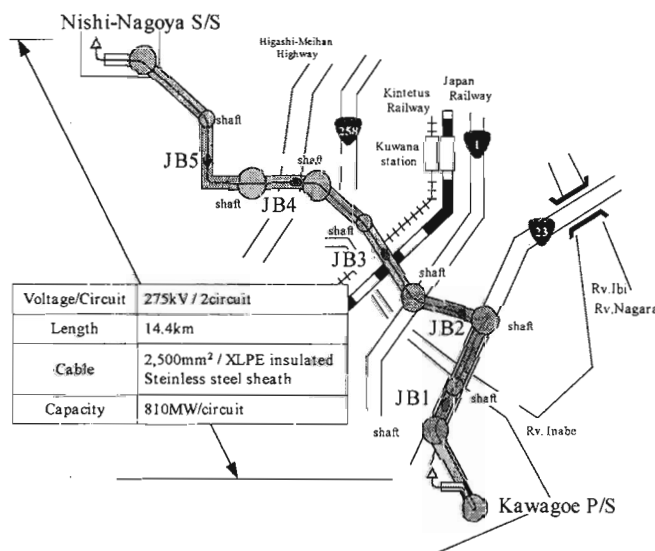


Fig.1 Kawagoe-Nishinagoya line route