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Construction of 275 kV underground transmission line composed of continuous 2,500 m long XLPE cables

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Since 1994, we have been using XLPE cable with 2500 mm² copper conductor and stainless metal sheath for 275 kV Underground Transmission Lines in Chubu area, Japan.

It is known that the cable connecting technique, called EMJ (Extruded Mold Joint), relies considerably on human skill, that requires much assembling time and cost. Because the reduction of the numbers of connections contributes much to the total cost cut and quality improvement, we challenged to make the cable longer by improving all the construction process, such as cable manufacturing, transporting and installing into the tunnel. And in 1998 we achieved 1800 m as the maximum cable length, though it was 600 m at the beginning.

Furthermore, we are now installing far longer cable of 2500 m, as Kawagoe-Nishinagoya Underground Transmission Line (14.4 km distance, 2 circuits). In this project, we overcame the difficulty that had prevented us from getting the cable longer.

The cable length was restricted to maximum 1800 m, because the length of stainless tape for cable metal sheath was limited by manufacturing equipment capability in the factory.

In order to make this tape longer, we developed and established the technique of welding connection of two long stainless tapes by fixing them rigidly, and that removed the manufacturing restriction above.

But too long cable forces manufactures to pay far more cost in investment on their equipment and cable transporting. By taking all costs factors into consideration to make total cost minimum, we decided the cable length to be 2500 m, the longest in the world for this kind of XLPE cable.

We improved the way of laying this cable of 2500 m too. We used a motor roller as well as before to lay the cable in the tunnel. This time, a construction speed was sped up by adding an inverter to the control board of the motor roller to 9 m per minute which was a limit of the motor from usual 7 m per minute.

Compared with the previous method of 1800 m cable, we got an excellent result in reduction of both 10% of total cost and 2 months in installation period.