

## LONG TIME OPERATIONAL EXPERIENCE WITH 400 KV XLPE POWER CABLE SYSTEMS IN BERLIN

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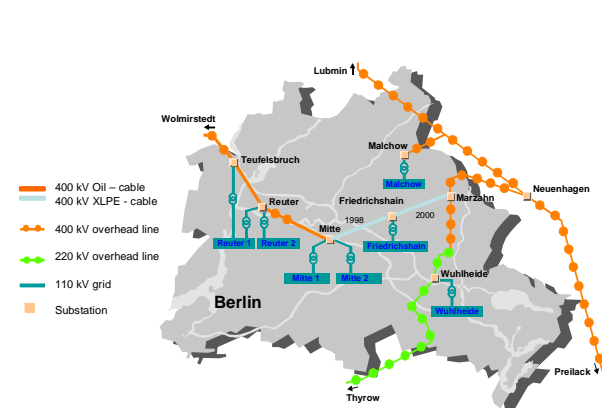
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### 1. Summary

In 2000, the last section of a 400 kV diagonal transmission link through Berlin was put into operation. The transmission link represents one of the first cable system in the world for which the 400 kV XLPE cable with the new developed jointing technology was used. Long-term testing of 400 kV XLPE cables and accessories were conducted for the first time in order to test the durability of this new technology. The results have shown that the development of this new technology was not ended by type testing, but that long-term effects and ageing mechanisms were to be taken into account. Therefore, test criteria were adapted to the recommendation issued by the CIGRE in 1993 [ 1 ]. Nowadays, these criteria are still stricter than the IEC guidelines. After more than 10 years of operating a total of 23 systems -km XLPE cables, we are reporting about our experiences with these installations.

### 2. Introduction

The reunification of Germany and the unification of the two halves of Berlin within one energy supply area were requiring a supply concept which would ensure the future energy supply of the capital city. Investigations showed that by using the 400 kV oil-filled cable laid in the seventies, the most sensible solution on an economical and technical point of view was to build a diagonal transmission link through the city.



Picture 1: 400 kV diagonal with underlying 110 kV sub-networks.

In the area of the city centre of Berlin, two tunnel installations with an inner diameter of 3 m and a length of 6.3 km and 5.2 km were built for the XLPE cables to be laid.

There were no prior operational experiences with 400 kV XLPE cables and their components.

In order to reach a decision on the quality and usability of the new technology, a prequalification test was advertised, in which the producers had to confront their technological concept with long-term testing. The prerequisite for participating was successful type testing of the cables, joints and terminations.

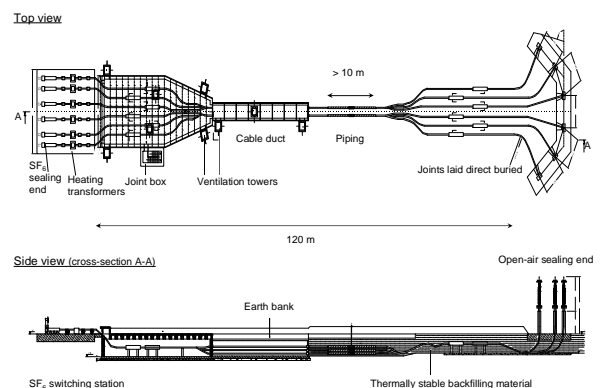
Only the pre-qualified producers were entitled to submit a bid for the construction.

### 3. Operational applicability of 400 kV XLPE cables

#### 3.1 First test series on 400 kV XLPE cables

The most important objective of the prequalification test was to provide evidence on the operational usability of cables, joints and SF<sub>6</sub> and/or outdoor termination.

Apart from the dielectric and thermo-mechanical properties, we had to gain experience on the suitability for laying and the free space necessary for the montage of the equipment under building site conditions.



Picture 2: Structure of the prequalification examination