The network connection of Niehl 3 CCPP - Germany's first 380 kV long-distance cable project since the Bewag projects in 2000

Fabian **SCHELL**; Fichtner, Stuttgart, Germany, fabian.schell@fichtner.de
Heinz **UHLENKÜKEN**; Rheinische Netzgesellschaft, Cologne, Germany, heinz.uhlenkueken@rng.de

ABSTRACT

RheinEnergie, the municipal utility of Cologne, is building a third block of the Niehl CCPP, located within the Cologne harbor area. With a total length of almost 9 km, the underground section of the Niehl 3 network connection will be the longest 380 kV point-to-point XLPE underground cable link built in Germany since the two Bewag tunnel projects in Berlin in the late 1990s. Besides providing the technical particulars of this new 380 kV cable system, this paper illustrates the challenges that were faced during project planning, prequalification, construction and testing.

KEYWORDS

380 kV, XLPE insulated cable, extended prequalification, DIN IEC 62067, VDE 0276-2067, distributed temperature sensing, monitoring of sheath currents.

INTRODUCTION

In spite of the network reinforcement created by the so-called German "*Energiewende*", there have not been many long distance EHV AC underground cable projects in Germany over the past 15 years. However, apart from that there are sometimes other reasons for undergrounding EHV lines arising from project specific demands like in the presented case.

In 2012 RheinEnergie decided to build a new 450 MW block at the existing plant location of the Niehl combined-cycle power plant within the Cologne harbor area. This particular location however made a solution for the network connection to the 380 kV transmission level more challenging.

In fact, an underground cable connection between the plant-side GIS and the transition point to the overhead line at Merkenich substation soon turned out to be the only viable solution.

A first attempt from RheinEnergie for finding a suitable route for the underground section resulted in a cable system length of about 7 km. However, that cable route would have lead to some extent along residential areas and therefore had been hampered by the public in early 2013. With a total length of almost 9 km, the new alternative solution proposed by RheinEnergie then turned out to become the longest 380 kV point-to-point XLPE underground cable connection realized in Germany since the two Bewag tunnel projects in Berlin commissioned in 1998 and 2000 [1]. Compared with other major German 380/400 kV cable projects commissioned over the past 15 years, the underground section of the Niehl 3 network connection - project name: NAN3 - ranks first position in terms of length (see Table 1). It also takes a particular position in terms of complexity of the environment.

Project	In service	Length	Circuits	Conductor
NAN3	2015	9.1 km	1	1x1600 Al
Bewag 1	1998	6.5 km	2	1x1600 Cu
Bewag 2	2000	5.4 km	2	1x1600 Cu
Raesfeld	2015	~3 km	2	2x2500 Cu

Table 1: Large EHV cable projects in Germany

Figure 1: Connection scheme of NAN3 - 380 kV (red) and 110 kV (black)