

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

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Rheinenergie, the municipal utility of Cologne, is extending the existing CCPP in Niehl with a new 450 MW block. Due to the fact that the plant location is inside a harbor area, the grid connection has become a significant challenge, both - technically and legally. With a total length of almost 9 km, the approved underground section of the Niehl 3 grid connection (project name NAN3) will be the longest 380kV point-to-point XLPE underground cable link built in Germany since the Bewag tunnel projects in Berlin in the late 90ies.

Besides providing the technical particulars of this new 380kV cable system, this paper illustrates the challenges that the project developers, planners and contractors faced, resulting from a cable route which almost entirely leads through densely populated and industrial areas. First and foremost, there are the numerous HDD sections for road and railway crossings as well as plenty of existing utility lines in the vicinity of the cable trench. Based on the given design criteria, Rheinenergie's approach of establishing the most efficient solution for construction, thermal and electrical needs is explained.

Furthermore, background and details are provided of the extensive quality control program undertaken throughout production, the pre-execution phase and commissioning.

The test program for this project includes another innovation, as all tests were based on DIN VDE 0276-2067, the new German EHV cable standard (corresponding to IEC 62067) that came into force in summer 2013. According to that, a so-called "system sample test" covering cable samples from all production lots and a cable joint from current production had been requested besides the "normal" routine and sample tests.

Moreover, for the first time in Germany the "extension of an existing prequalification" (ePQ) as set forth in section 13.3 plus the National Comment (NC.2) of the above mentioned new German standard DIN VDE 0276-2067 has been performed. The differences from IEC 62067 requirements as well as some explanations for the somewhat more stringent parameters of this prequalification test are set out in this paper.

On top of the final high voltage test after installation according to DIN VDE 0276-2067, the prescribed commissioning test program foresees a heating cycle test of the fully installed cable system. The somewhat elaborate planning activities, benefits and outcomes are highlighted in this paper.

With the anticipated successful completion of the commissioning test program in the second quarter of 2015, one of the most complex underground cable projects in Germany will come to an end. And Germany's longest 380kV XLPE cable system will be handed over to its owner on schedule for commissioning of the new Niehl 3 CCPP.