

## Consulting:



The selection of plastic pipe materials and systems for underground installation has extremely long-term implications. Designed for a service-life of several generations, pipelines are scarcely accessible for retrospective modification once they have been installed:

- High-value surface occur
- Building construction follows underground activities
- Repair costs in case of damage can be a multiple of the original investment amount
- Diversion of traffic and blocking of roads is scarcely possible with today's high traffic densities

For these reasons, planners, project clients and operators of piping systems are confronted with the challenge of gathering the best possible knowledge of the potentials and limitations of pipe materials before a decision is made. In addition, the costs for underground engineering must also be taken into account. Actual pipe-system costs rarely make up more than 15 % of total costs, whereas the underground work and restoration of the surface account for 85 % or more. The use of trenchless installation methods thus presents significant cost-reduction potentials.

The egeplast team of consultants will be happy to help you in every decision-making phase.

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## Project Göttingen:

### High Voltage



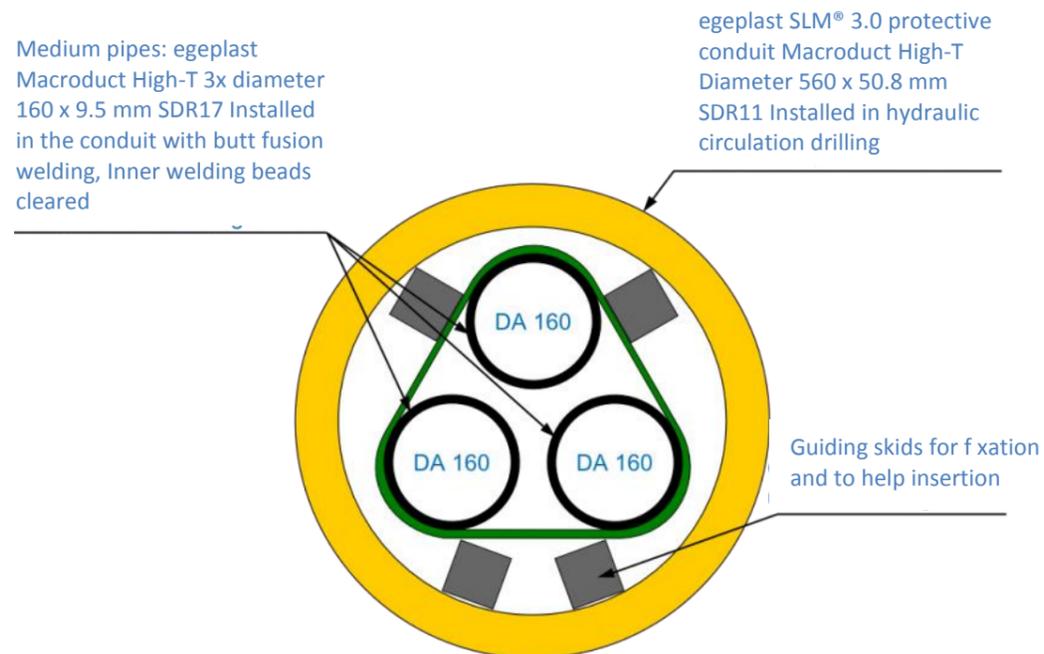
# Project report

## Göttingen: High Voltage

Network operator energieNetz Mitte faced extraordinary challenges when a new 1.6 km main power supply line for a 110 kV network was to be constructed. Security of supply for the city of Göttingen was the top priority. Due to the temperature fluctuations occurring in high voltage lines, the ege-com Macroduct High-T system was chosen - partially in the SLM® version- and was easily laid under the river Leine using hydraulic circulation drilling. The protective conduit can house three new medium pipes.

Project data	
Project description:	Construction of 110 kV – lines to safeguard Göttingen’s power supply
Challenges:	Trenchless construction of the conduit; Permanent temperature stress by the conductor cable of about 70°C
Solution:	Thermal resistant conduit solution ege-com® Macroduct High-T with protective layer
Installation and construction time:	Horizontal hydraulic circulation drilling: Length 2 x 90 m / Carried out as 2 parallel hydraulic drills / Construction period: august – september 2014
Pipe system:	A: ege-com® Macroduct High-T / B: ege-com® Macroduct High-T SLM® (with protective layer) Dim: 560 x 50,8 mm SLM® SDR 11, Quantity: 180 m Dim: 160 x 9,5 mm, SDR 17, Quantity: 564 m
Parties involved in the project:	Planning: Ingenieurbüro RINNE & PARTNER, Rosdorf; Pipe laying: GA Energieanlagen Nord, Northeim, Fachbereich Rohrleitungsbau Drilling: Leitungsbau und Bohrtechnik E. Galjard, Fuldaabrück Client: EnergieNetzMitte, ein Unternehmen der EAM Gruppe

### The conduit design used: Construction project “crossing of the river Leine” in hydraulic circulation drilling



Insertion of the medium pipes into the Macroduct High-T SLM® protective conduit



Butt fusion welding of the pipe ends.



Pipe end with watertight inner caps

„This line is of high importance for the supply of the city of Göttingen“, explains Michael Nolte of engineering consultants RINNE & PARTNER, in charge of planning, during the project meeting. The line is one of several supply lines and is of high importance for the security of supply for the city of Göttingen. Additionally, the general conditions are challenging: The soil conditions were difficult and demanding. And the river Leine had to be crossed below. Planners RINNE & PARTNER set another requirement to the high voltage conduit design and material: It had to be able to house three medium pipes.

#### Temperature stress in high voltage conduits

110 kV-high voltage lines can heat up to 95°C in operation. The three new 110 kV cables in Göttingen were expected to have an operational temperature of 70° C at the external insulation. Since normal protective conduits made of polyethylene are not designed for these temperature ranges, they wouldn't have offered the full protection over the entire planned service life. That's why the ege-com Macroduct High-T system was chosen. Thanks to a special material it combines the benefits of polyethylene with thermal stability. The system may even be used for 380 kV cables. Due to the difficult soil conditions and the necessary crossing of the river Leine, additional requirements to the conduit design arose. A scratch and groove protection was needed to prevent damages during installation. Therefore the SLM® model of the Macroduct High-T conduit was used, enabling a trenchless construction. The required joints for the conduit were established in butt fusion welding in accordance with the valid technical DVS guidelines. The dimensioning was predefined by the medium pipes the conduit had to house. Three new medium pipes with a diameter of 160 mm require an according protective conduit of 560 x 50,8 mm (SDR11). The permissible tractive forces are equal to pressure pipes made of PE 100. The medium pipe bundle consisted of three pipes of 160 x 9.5 mm each (SDR17). Fixed as a bundle, the cables were inserted into the protective conduit via guiding skids. The conduit ends were joined again in butt fusion welding. The inner welding beads were removed for an unobstructed entry of the power cables.



Due to the application of trenchless technology, interference in valuable surfaces is minimal.

#### Conclusion:

„The great welding characteristics of the supplied Macroducts High-T pipes have convinced us. After removing the welding seams cables can be inserted problem-free,“ concludes Rolf Seiler from GA Energieanlagenbau Nord about his experiences during the system installation.▪