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# Project Report

KPPS - pipe installation - Bree (Belgium)

## ■ KPPS pipe system DN 400, 10 bar

### Situation

The Flemish authorities of water supply in charge of the Belgium province Limburg were planning to install an additional supply line for potable water. From a depth of approx. 120m a high-performance pump ought to convey the water. The potable water runs through the newly laid pipe line to the water works where it will then be purified. It was essential to install a pipe line which resists an inside pressure of 10 bar. The actual working pressure will be 8 bar.

All previously installed pipe lines had been made of either steel or steel casting. For the pipe connections rubber gaskets were used.

As a result of the close cooperation between Krah AG and the Belgium research centre Becetel who does the testing of the newly developed KPPS pressure pipe, the planning department of the authorities of water supply decided to use this pipe system. The reach of 180m serves as reference for both Krah AG as well as for the Flemish authorities of water supply. It was very important that not only the pipes and the joints were tested but also the complete range of fittings.



Installation area



Electro fusion welding



Production station

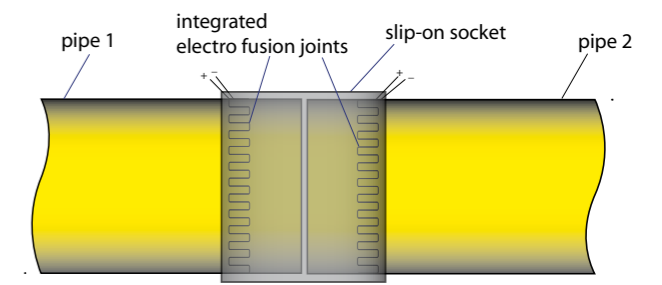
### The job

In preparation for the connection to the water works the three T-pieces were connected to each other by using several gate valves. Thus it was possible to install the complete distribution unit in a whole at a later stage.

First of all the old pipeline had to be removed in order to do the new connection to the water works. Then the pre-assembled distribution unit was put in place and connected to the existing pipeline. For the connection to the water works one pipe with flange connection was cut to fit in length and fitted to the water works. The connection to the distribution unit was accomplished with a slip-on socket with two integrated heating spirals. The same joining technique was applied when connecting the completed pipeline to the distribution unit.

After the completion of the laying a pressure test was performed over the whole range of the pipe line. Testing pressure was 11 bar for a period of 6 hours. There wasn't any decrease in pressure noted.

So, the complete system meets all demands of the complex project.



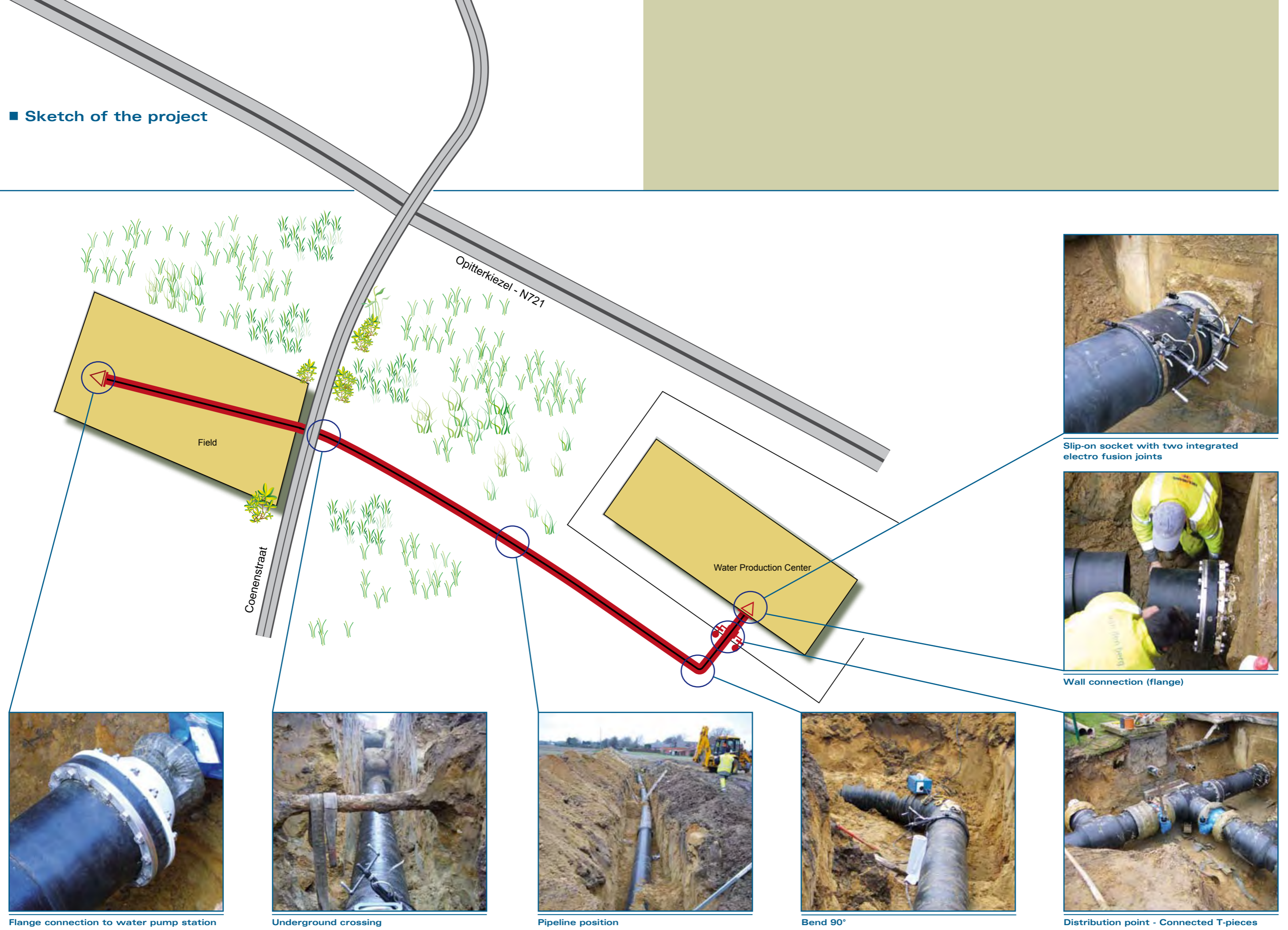
Slip-on socket with two electro fusion joints

### The components

- 180m KPPS pipes DN400, 10 bar, having a wall thickness of 15mm with integrated electro fusion sockets and spigot ends
- 2 pcs. Bends 45° DN400, 10 bar, made of KPPS pipe with integrated electro fusion socket and spigot end
- 3 pcs. T-pieces with flanged connection
- 1 pcs. KPPS pipe DN400,10 bar, with flange and spigot end
- 3 pcs. KPPS pipes DN400,10 bar, with flanges and plain ends
- 2 pcs. Slip-on sockets with two integrated electro fusion joints

The installation of the pipes was started with the connection to a gate valve with flange connection, being part of the pumping station which had already been in place. This is where the first pipe, type flange/spigot end, was fitted. All other pipes were joined by means of the formed electro-fusion socket. In the trench always two pipes were prepared in advance making it possible that once the first welding was completed and the cooling period started, the second welding could be done right away. The welding time for each joint was 20 min. and the welding was done by a standard electro fusion welding device. Every pipe had a label with the barcode for the welding procedure. After finishing the job, a welding report was generated.

■ Sketch of the project



Flange connection to water pump station



Underground crossing



Pipeline position



Bend 90°



Distribution point - Connected T-pieces



Slip-on socket with two integrated electro fusion joints



Wall connection (flange)

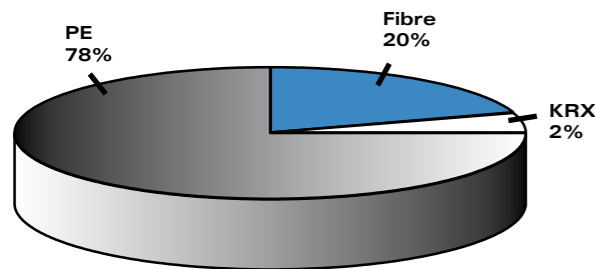
## ■ The KPPS Technology

### A large diameter pressure pipe system made of PE GFR

The KPPS system contains pipes with an internal diameter of 300 mm up to 4000 mm in a length of 6 m, with a standard working pressure of 10 bar. Other pressure classes are possible and the production range is not limited to the upper mentioned numbers. All kind of fittings, reductions, branches etc. round off the total system.

The KPPS piping system penetrates a market segment where the use of the following pipe systems was common in the past:

- Steel Pipes
- PCCP (Prestressed Concrete Cylinder Pipes)
- GRP (Glas Faser Reinforced Pipe)
- Ductile Pipes
- Polyethylene Pipes
- Polypropylene Pipes



proportion of used material

The pipe material is a compound of standard polyethylene (pipe grade), fibre and bonding material KRX. It is classified with a minimum required strength-value (MRS) of 20 MPa, according to ISO 9080. By using polyethylene (pipe grade) as the main material, the pipe properties fulfil all requirements to call it a 'flexible' pipe. Furthermore the pipe features nearly all other properties of polyethylene i.e. supreme hydraulic capacities.

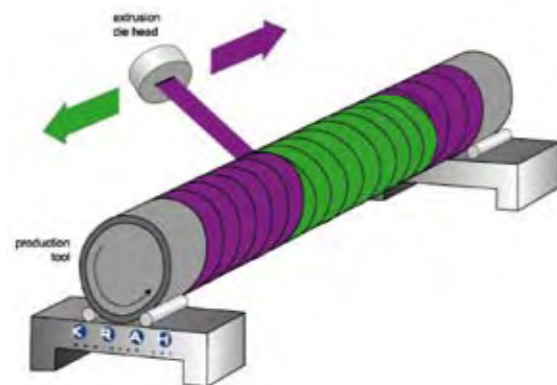
Basically the pipe wall is built in three layers in only one extrusion procedure. The inner and outer wall is 100% polyethylene and the middle layer is made out of the compound.



Cross section of the pipe wall

The KPPS' nominal diameter (DN) is always the internal diameter, as during the production process the pipe is calibrated on the inside. The result is that the hydraulic capacity of one nominal diameter will remain the same and is not related to the pressure class. The material hysteresis (memory effect) is excellent and the pipes fulfil all requirements of flexible pipes according to EN 1446.

The unique jointing system is the integrated electro fusion joint, which allows an easy, quick and secure jointing for all pipe system components. Moreover the socket is produced during the pipe extrusion.



Kraih Spiral Cross Winding Process

## ■ Result

### Conclusion

By choosing KPPS pressure pipes Bree community decided in favour of a sustainable, durable pipe system. The laying of the pipe line was completed without any problems worth mentioning.

Because of the material the welding of the KPPS pipe takes longer than welding of PE-sewer pipes. In order to achieve best possible workflow during the laying it is recommended to use at least 2 electro-fusion machines for welding. After the successful termination of the Bree Project it is safe to say that the KPPS technology is both technical and economical an excellent alternative to pipe materials and systems which have already existed so far.

The length of the Electro-Fusion joint is calculated for the nominal working pressure. The welding can be done in a very short time and even in narrow trenches, but in dry conditions. All required fittings like bends, reductions, etc. are producible.

The production technology is based on the Kraih Spiral Cross Winding Process. This is a direct extrusion process, where different raw materials are mixed and extruded in one shot not requiring any additional ready-made compounds. To guarantee the exact material ratio and the correct output, the extrusion unit is equipped with a gravimetric metering system and an intelligent computer operation system.

### Customer

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### Project Monitoring

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### Pipe Producer

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### Material Producer

(HDPE XLS12B, HDPE XS10B)

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