References

Renovation of cast iron water supply pipeline - swagelining



Uponor involvement

- Pressure pipes PE WehoPipe PE100 DA800 SDR17 PN10 – approx. 600 m

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Thanks to swagelining technology, it was possible to carry out most of the water line modernisation works in the centre of the city of Łódź, in a built-up area, along traffic lanes with heavy traffic of motor vehicles and trams.

Dąbrowa water supply in Łódź pumps water from Water Treatment Station at Lodowa Street to Stoki Reservoirs at Pomorska Street. The water is accumulated there and then delivered to 1/3 of the city. With the help of the Cohesion Fund from the European Commission, in mid 2008 the city started a project called Water lines and sewage treatment unit in Łódź II. The total value of the works carried out under this project was EUR 142 million. The project also included the contract “Dąbrowa Water Line – modernisation of Łódź Water Supply System – Part 02C Dąbrowa Water Line – Modernisation of treated water line” with a value of almost EUR 3.5 million. The water line with a nominal diameter of 750 mm and approximately 5,440 m long, was modernised under this project.

Project Facts:

Location
Łódź, Poland

Completion
2009

Vrsta objekta
Municipal

Product systems
Potable water, Renovation

Project Type
Renovation

Partners

Contractor:
Consortium of companies: Infra SA (consortium leader), PBG SA (consortium partner), Wiertmar sp. z o.o. (consortium partner) and Bud-Inż. sp. z o.o. (consortium partner)

The Employer (Łódzka Spółka Infrastrukturalna) suggested that the water line be renovated using swagelining technology. Swagelining is ‘‘a tight fit’’ method which concerns putting PE pipes of temporarily reduced diameters into the damaged pipeline (it takes place by heating the pipes and applying the constant drawing force). After the pipe is pulled the drawing force is released and PE pipe through expansion adapts its diameter to internal diameter of old pipe. This way additional structural reinforcement of repaired pipeline is obtained.

For this purpose the contractor Wiertmar initially used DN/OD 800 SDR17 PE pipes, with a wall thickness 47.4 mm, made by X. ‘‘We do not quote the manufacturer’s name on purpose since the test has not been successfully completed. The works were carried out in the winter. They started with butt-welding 12-metre pipe lengths. It turned out, however, that the X pipes were stiff, with low plasticity and they did not keep the round dimension’’, said Mr Marek Piekarski, the Chairman of Wiertmar. ‘‘It was difficult to position them correctly in the welder.’’ Later, however, a yet more serious problem was identified. After the welding stage, the installation phase followed, during which the weld broke while the pipe was being pulled through the reducer. Therefore, the PE pipe was taken out immediately. Fortunately, the pipe had not relaxed and so was not tightly fitted into the original pipe.

The contractor decided to analyse this situation and sent the X pipes to two laboratories to be tested. On the basis of the test results it was concluded that the pipes did not meet the requirements of PN-EN 12201-2 standard in terms of wall thickness. The other test results met the requirements of the standard. It was decided to keep the X pipes, since extensive tests performed in adverse weather conditions indicated that it was possible. Unfortunately, this time too, the test failed and the weld broke.

Therefore, it was immediately decided to change the pipe manufacturer. This time WehoPipe PE100 DN/OD 800 SDR17 PN10 pipes, wall thickness 47.4 mm, produced by Uponor Infra (former KWH Pipe Poland), were chosen. On special order, 15-metre pipe lengths were manufactured to shorten the welding time. The pipes were delivered to site a few days later. ‘‘It was enough just to look at the pipe surface to see a considerable difference between the KWH and X pipes’’ said Marek Piekarski. ‘‘The pipes delivered kept their round shape, their surface was perfectly smooth while the X pipe surface resembled orange peel. We also noticed that the new pipes had higher plasticity.’’

This time welding was smooth and fast, and installation went without any problem.The tight fit method was applied in the first section of the water supply pipeline at the exit from the Water Treatment Station, where the highest hydraulic hammering occurs and where the pipeline was used the most, near the passages under a very busy roads (Dąbrowskiego, Przybyszewskiego, Piłsudskiego streets), under PKP tracks and tram tracks.

The Łódź contract was another test both for the contractor, Wiertmar and for Uponor Infra, the pipe manufacturer and supplier. Although swagelining technology was a great challenge, thanks to this method it was possible to minimise inconvenience to traffic. Most of the work was carried out in the centre of a city with a population of 750,000, in a built-up area, along traffic lanes with heavy traffic of motor vehicles and trams, in adverse winter-spring conditions. The fact that Wiertmar is ready to continue using swagelining technology can be seen as a special acknowledgement of WehoPipe and Uponor Infra.

Parameters of renovated pipeline:

- outer diameter of the PE pipe used as the lining - 800 mm;
- inside diameter of renovated pipeline - 750 mm;
- outer diameter of PE pipe after it was pulled through the reducer – approx. 730 mm;
- outer diameter of PE pipe after relaxation process – approx.760 mm.

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