References

A raw water system for the new power unit



Uponor involvement

- Pressure pipes PE100 PN16 SDR11 DN980x88,9 mm and PE100 PN10 SDR17 DN910x53.9 mm - a total of about 9 km and fittings

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To ensure failure-free operation of a raw water system, a polyethylene-made pipeline (PEHD) with a length of approximately 9 km was installed (in mining damage conditions), of which 3 km uses the trenchless technique – relining.
At the end of 2019, a new power unit with a capacity of 910 MW will be ready in the Jaworzno Power Plant. One of the key elements influencing the efficient operation of the new power unit is a pipeline supplying water to the cooling system and to the flue gas desulphurisation plant. Any failure within this system could result in the shutdown of power generation. To ensure its failure-free operation, a polyethylene-made pipeline (PEHD) with a length of approximately 9 km was installed (in mining damage conditions), of which 3 km uses the trenchless technique – relining.

Project Facts:

Location
Jaworzno, Poland

Completion
2018

Building Type
Industrial

Product systems
Tailor made constructions, Industrial pipes

Project Type
New building

Partners

Designer:
Uniserv S.A.

Investor:
TAURON Wytwarzanie S.A. Oddział
Elektrownia Jaworzno III w Jaworznie

Contractor:
Uniserv S.A.

When planning the raw water pipeline, the investor, Tauron Wytwarzanie S.A., assumed that it would be composed of GRP pipes. One of the decisive factors taken into account at that time was the investment costs, as a GRP pressure system is cheaper than PE. In view of the fact that the pipeline was to be built in areas where mining damage has occurred (including category IV areas, the highest category) and, consequently, in places where the use of separable connections would be very risky, Uponor Infra requested a technical dialogue with the Investor. Eventually, the Investor initiated discussions. The Investor decided that the system's failure-free operation was crucial, as stopping the operation of a power plant as a result of its failure would result in financial losses of even several million PLN each time. As a result of the conducted analyses, the Investor decided to redesign the pipeline and replace the GRP technology with the PEHD technology as a matter of urgency. At the same time, the Terms of Reference (ToR) required the manufacturer to grant a guarantee not only for pipes and fittings, but also for connections. The Uponor Infra company provided 5-year references on the failure-free operation of its products in similar conditions and provided a warranty for the entire system (both for the material and weldings), and therefore it became involved in the project implemented in Jaworzno.

A complicated operation

The new block in Jaworzno will receive water from the Dziećkowice reservoir. The pipeline for its transmission is approximately 9 km long, of which approximately 6 km is laid in an open trench and approximately 3 km is constructed using the trenchless technique – relining. WehoPipe DN910 x 53.9 and DN980 x 88.9 pipes produced at the Uponor Infra factory in Kleszczów were used for the construction of the raw water pipeline. Due to the high pace of pipe-laying, the production was carried out in two parallel lines in order not to cause supply stoppages and therefore not to stop the works – this required the manufacturer to ensure a high degree of flexibility and careful planning of the production and delivery schedule.

In total, 201 pipes PE100 SDR17 DN910x53,9 with a length of 15 m each and 386 pipes PE100 SDR11 DN980x88,9, also 15-metre long, were produced for the construction of the raw water pipeline. Deliveries of pipes and fittings took place in the period from October 2017 to September 2018. This required the mobilisation of more than 170 transports. Every delivery had to be carried out according to the procedures of the construction site, so it had to be notified in advance each time due to the need to unload and arrange for the storage of the materials.

In 2018, an average of 2190 people worked on the construction site of the 910 MW unit in Jaworzno each day. On the other hand, on the part of the pipe manufacturer, at the moment of the highest concentration of work, three operators were working simultaneously with three welding machines for the DN910 and DN980 pipes. In order to meet the deadlines, Uponor's service teams were expanded to include welding teams from the piping company, which were supervised by an employee representing the supplier. The work related to the welding of the pipes was carried out in the period from December 2017 to September 2018. Since positive temperatures had to be maintained at the welding site, tents and heaters had to be used in winter.

Why choose polyethylene-made pipes?

The construction of cubature structures and infrastructure facilities in areas where mining damage occurs is particularly demanding and involves increased risk. Therefore, in order to avoid potential failures, in the case of the pipeline construction for the new power unit in Jaworzno, polyethylene-made pipes with increased strength parameters were used. The main advantage of PE pipes over GRP is their flexibility, which allows for significant elongation without interruption of continuity, which means maintaining continuity of operation especially in areas threatened by landslides or rock-backs. It is also important that the PE pipes are welded so that the pipeline is homogeneous and there are no gasket connections that could, with such high categories of mining damage, simply become unsealed. For comparison, the GRP system is much more rigid and the individual components are connected by means of cups with a gasket.
In such difficult working conditions, the proposed construction technology proved to be the only one that provided real operational safety for this water supply system.

Big projects are almost a matter of everyday life

The project implemented in Jaworzno is not the first project of its kind undertaken by Uponor Infra. Previously, the company was involved in the construction of power units at the Bełchatów and Kozienice power plants (raw water pipelines). It also participated in the modernisation of the cooling water system and the circulation system for the Zakłady Azotowe Puławy (Azoty Group) and in the renovation of industrial and cooling water pipelines (Synthos S.A.). Further large contracts are planned in the industrial sector for next years, because the HDPE system, due to its advantages, is becoming an increasingly frequent choice of investors, for whom reliability is the key issue.

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